

Empirical Testing of a Conceptual Model and Measurement Instrument for the Assessment of Trustworthiness of Project Team Members

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Empirical Testing of a Conceptual Model and Measurement Instrument for the Assessment of Trustworthiness of Project Team Members

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Abstract. We have earlier proposed an alternative model for trustworthiness in vocational contexts, consisting of several additional antecedents to the commonly accepted antecedents of ability, benevolence and integrity. Examples of these antecedents are “communality” and “accountability”. By reviewing literature about the measurement of trust and trustworthiness, we operationalized and specified the model. In this paper we describe the resulting measurement instrument and the results of an empirical evaluation test of this instrument.

Keywords: Trust; Trustworthiness; Virtual teams; Collaboration; Measurement Instrument

1 Introduction

In this paper we describe the operationalization and evaluation of a new conceptual model for trustworthiness in vocational contexts. Research on trust has predominantly used the model of Mayer, Davis, & Schoorman (1995) to operationalize and measure trustworthiness. The key antecedents of trustworthiness in this model are ability, benevolence and integrity. The model was based on extensive literature research and developed within a particular domain, namely management, but with the purpose of integrating various content perspectives. The selection of (inclusion, deletion) of several antecedents mentioned in the literature was based on a conceptual analysis and ‘common sense’. Many researchers have used and accepted this model to define and measure trustworthiness, without setting up an empirical study. In a recent article (Schoorman, Mayer, & Davis, 2007), the original authors of the model urge researchers to reconsider and to elaborate the model, with a special emphasis on the issue of measuring trust and trustworthiness. We have developed such an alternative model (Rusman et.al., submitted), based on an extensive and interdisciplinary literature review of antecedents of trustworthiness. In this paper we shortly present and elaborate on this model. Moreover, we report the results of an empirical study that helps to validate an operationalization of this new model. A comprehensive picture of the validation results will be presented during the workshop.

1.1 An Alternative Model for Trustworthiness: Development of a Measurement Instrument

Trustworthiness is the individual's assessment of how much and for what type of performance a trustee can be trusted (Hardin, 2002). People assess trustworthiness by collecting signs of particular characteristics of an other person and these are 'tested' against their conceptual model of trustworthiness. In this way one determines for instance whether this person is friendly, open, reliable, consistent etc. We have developed an alternative model based on extensive literature review (Rusman et.al., submitted). To develop an instrumental and operational version of this model, we reviewed an additional 43 articles (see attachment 1 for an overview of reviewed literature) that reports on the development or use of specific scales or instruments to determine trust and trustworthiness. This resulted in an inventory of key methodological questions when measuring the antecedents of trustworthiness. Based on this inventory, we developed subscales consisting of four items/questions in view of each antecedent. Positive and negative phrasing of questions were balanced. This resulted in an instrument with the following operational structure (figure 1) and related questions (table 1). The test version of the instrument consists of 92 questions.

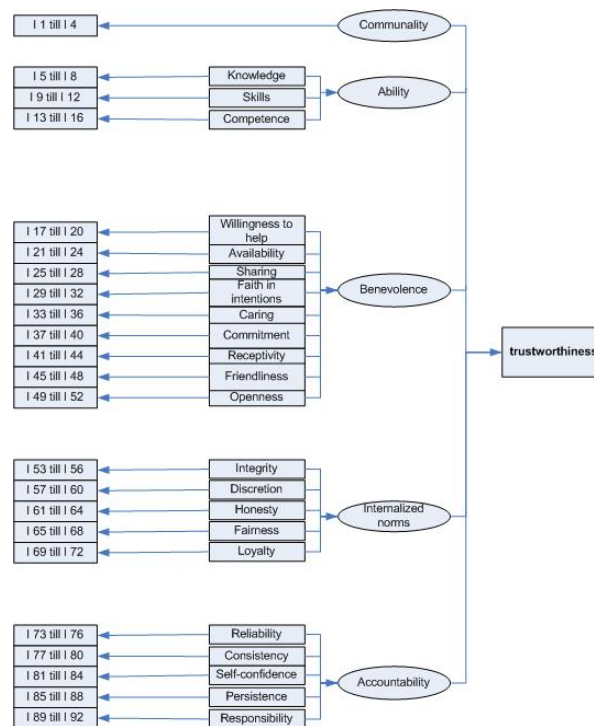


Fig. 1. Operationalization of trustworthiness

Table 1. Selected items presumably measuring antecedents of trustworthiness

Antecedents of trustworthiness (AT), items and variable names
Communality (COM)
I 1: I trust because he/she shares the same interests (AT_COM_int) I 2: I trustbecause he/she shares my expectations and goals of the project (AT_COM_goal) I 3: I don't trust ... because he/she has a different communication style than mine (AT_COM_com)* I 4: ... work values are not very similar to mine (AT_COM_work)*
Ability
Knowledge (KNOW)
I 5: I trust ... to contribute relevant expertise to this project (AT_KNOW_expert) I 6: I trust to indicate the limitations of his/her knowledge (AT_KNOW_limit) I 7: ... is not very knowledgeable about his/her discipline (AT_KNOW_discip)* I 8: ... has not so much knowledge which is relevant for the work that needs to be done (AT_KNOW_work)*
Skills (SKIL)
I 9: In his/her job ... seems to work efficiently (AT_SKIL_effic) I 10: I have full confidence in the skills of (AT_SKIL_conf) I 11: does not perform his/her tasks with skill (AT_SKIL_perf)* I 12: I cannot rely on the task-related skills of ... (AT_SKIL_rel)*
Competence (COMP)
I 13: does things competently (AT_COMP_comp) I 14: does things in a capable manner (AT_COMP_cap) I 15: I feel that ... is not good at what he/she does within the project (AT_COMP_good)* I 16: ... seems to be unsuccessful in the professional activities he/she undertakes (AT_COMP_unsuc)*
Benevolence
Willingness to help (HELP)
I 17: If I got into difficulties with work I know would try and help me out (AT_HELP_dif) I 18: I can trust... to lend me a hand if needed (AT_HELP_hand) I 19: If I required help, ... would not do his/her best to help me (AT_HELP_best)* I 20: I feel that I can not count on ... to help me with a crucial problem (AT_HELP_count)*
Availability (AV)
I 21: It's usually hard for me to get in touch with (AT_AV_touch)* I 22: ... is available when I need him/her (AT_AV_avail) I 23: I can usually reach ... when I need him/her (AT_AV_reach) I 24: I am not able to contact readily ... when it is required (AT_AV_con)*
Sharing (SHA)
I 25: Even if I didn't ask ... to share knowledge with me I feel certain that he/she will (AT_SHA_share) I 26: I feel that keeps information from me (AT_SHA_keep)* I 27: ... does not pass information or ideas on that can be helpful to you or the project team (AT_SHA_pass)* I 28: ... timely shares any relevant information (AT_SHA_time)

* Question posed negative

Faith in intentions (FI)
I 29: I think that takes advantage of me (AT_FI_advant)* I 30: I feel that ... takes advantage of people who are vulnerable (AT_FI_vuln)* I 31: I can rely on to react in a positive way when I expose my weakness to him/her (AT_FI_weak) I 32: Sound principles seems to guide the behaviour of ... (AT_FI_princ)
Caring (CA)
I 33: If I share my problems with him/her, ... will respond constructively and caringly (AT_CA_constr) I 34: ... does not keep my interests in mind when making decisions (42, adapted) (AT_CA_decis)* I 35: ... cares about the well-being of others (25, adapted) (AT_CA_others) I 36: ... is primarily interested in his/her own welfare (16, item 1 adapted) (AT_CA_own)*
Commitment (COMIT)
I 37:... makes considerable investments in our working relationship (AT_COMIT_inv) I 38: ... is not strongly committed to the project (AT_COMIT_com)* I 39: ... does not do everything within his/her capacity to help our team perform (AT_COMIT_cap)* I 40: ... does everything what is possible in order to meet the project goals (AT_COMIT_goal)
Receptivity (REC)
I 41: ... makes an effort to understand what I have to say (AT_REC_eff) I 42: ... is sincere in his/her attempts to meet my point of view (AT_REC_sinc) I 43:... often fails to listen to what I say (AT_REC_list)* I 44: Often ... does not pay full attention to what I am trying to tell him/her (AT_REC_atten)*
Friendliness (FRI)
I 45: If I make a mistake, ... is willing to forgive (AT_FRI_mis) I 46: ... is friendly and approachable (AT_FRI_appr) I 47: If unexpectedly laughed at something I did or said, I would wonder if he/she was being critical and unkind (AT_FRI_crit)* I 48: If ... asks why a problem occurs, I will not speak freely when I am partly to blame (AT_FRI_speak)*
Openness (OPEN)
I 49: lets me know what's on his/her mind (AT_OPEN_mind) I 50: shares his/her thoughts with me (AT_OPEN_share) I 51: ... doesn't tell me what is really going on (AT_OPEN_tel)* I 52: ... is secretive (AT_OPEN_secr)*
Internalized norms
Integrity (INT)
I 53: can not be corrupted (AT_INT_nocor) I 54: ... is a corruptible person (AT_INT_cor)* I 55: I have faith in the integrity of ... (AT_INT_fait) I 56: ... is not honest in describing his/her experience and abilities (AT_INT_hon)*
Discretion (DISC)
I 57: If I give confidential information, he/she keeps it confidential (AT_DISC_conf) I 58: does not tell others about things if I ask that they be kept secret (AT_DISC_secr) I 59: I lack confidence in the overall discretion of ... (AT_DISC_discr)* I 60: ... talks too much about sensitive information that I give him/her (AT_DISC_sens)*

Honesty (HON)
I 61: I feel that ... works with us honestly (AT_HON_hon) I 62: I think that ... does not mislead me (AT_HON_mis) I 63: Even when ... makes excuses which sound rather likely, I am not confident that he/she is telling the truth (AT_HON_conf)* I 64: Sometimes ... changes facts in order to get what he/she wants (AT_HON_fac)*
Fairness (FAIR)
I 65: treats me fairly (AT_FAIR_fair) I 66: ... treats me on an equal basis with others (AT_FAIR_equ) I 67: treats others better than he/she treats me (AT_FAIR_bett)* I 68: ... is unfair in dealings with me (AT_FAIR_unfair)*
Loyalty (LOY)
I 69: I can discuss problems with ... without having the information used against me (AT_LOY_prob) I 70: would never intentionally misrepresent my point of view to others (AT_LOY_misp) I 71: If I make a mistake, ... will use it against me (AT_LOY_mist)* I 72: If ... didn't think I had handled a certain situation very well, he/she would criticize me in front of other people (AT_LOY_crit)*
Accountability
Reliability (REL)
I 73: Keeping promises is a problem for ... (AT_REL_keep)* I 74: does things that he/she promises to do for me (AT_REL_prom) I 75: If promised to do me a favour, he/she would follow through (AT_REL_fav) I 76: I feel that will not keep his/her word (AT_REL_word)*
Consistency (CONS)
I 77: behaves in a very consistent manner (AT_CONS_con) I 78: I sometimes ignore because he/she is unpredictable and I fear writing or doing something which might create conflict (AT_CONS_unpr)* I 79: I seldom know what will do next (AT_CONS_nex)* I 80... responds the same way under the same conditions at different times (AT_CONS_dif)
Self-confidence (SEC)
I 81: ... has high self esteem (AT_SEC_est) I 82: I think that ... is very self-confident (AT_SEC_conf) I 83: I feel that ... is insecure of her/himself (AT_SEC_insec)* I 84: ... has low self esteem (OI) (AT_SEC_lowest)*
Persistence (PER)
I 85: Even in hard working circumstances, I can count on to follow through on work commitments (AT_PER_com) I 86: In the face of difficulties I can count on to solve problems and meet work commitments in time (AT_PER_prob) I 87: In difficult working circumstances ... fails to follow through on work commitments (AT_PER_fai) * I 88: When encountering problems ... lacks the courage to constructively start working on them (AT_PER_constr)*

Responsibility (RES)
I 89: I can rely on not to make my work more difficult by careless work (AT_RES_dif)
I 90: I feel that.... tries to get out of his/her work commitments (AT_RES_com)*
I 91: ... would go on with his/her work even if nobody checked it (AT_RES_work)
I 92: ... readily denies responsibility for problems incurred by his/her mistakes (AT_RES_prob)*

Considering the available operational model, we focused on the following questions:

- Is the proposed conceptual model valid? (construct validity)
- Do the questions in the questionnaire measure what they intend to measure? Can the proposed measurement instrument indeed distinguish between different levels of trustworthiness (content validity)?
- Is the questionnaire internally consistent (reliability)?

2 Method

In order to test our model and measurement instrument we set up an empirical study at the Ghent University, Belgium. To consider the language background of the respondents, we translated the English version of the questionnaire into Dutch. This translation was checked independently by two experts.

2.1 Nature of the research instrument

The questionnaire – discussed above - builds on open, as well as close-end questions. The close-ended questions refer to the antecedents of trustworthiness and reflect the items represented in Table 1. All items/questions were shuffled, to prevent bias interference when replying to subsequent items. Respondents could not recognize the relationship between questions and a specific antecedent. Respondents were asked to react to individual questions with a 7-point Likert scale: (1) Strongly disagree, (2) Disagree, (3) Slightly disagree, (4) Neutral, (5) Slightly agree, (6) Agree and (7) Strongly agree. Respondents were asked to react to the questionnaire items by keeping a person in mind which they trusted most and least. We expected, in this way, to trace differences in measurement.

Open-ended questions referred to background variables of respondents, such as gender, age, organization, function, duration of the project, goals of the project, number of people participating in the project work, degree of personal acquaintance with other project team members and the means of communication within the project (e.g., face to face/audioconferencing/videoconferencing).

2.2 Procedure

The study was conducted partly by bachelor level research-students, enrolled in the Educational Sciences program at the Ghent University. These research students

are involved – in the context of a practical 10 credit course – in a number of research studies in view of developing research competences. Students participate in collaborative research activities, under guidance of an experienced researcher. Students are introduced to the research field via a guest lecture about trustworthiness, and are informed about the main research questions of the study, the research approach and a concrete protocol about the nature of respondents they were expected to involve in their research activity. Research students worked in groups of 10 and were given a detailed research portfolio containing all practical materials needed to perform the study. Students received the questionnaires, an instruction, a list with the scales and items and the names of the variables together with a predefined excel-file, containing the variable names fixed in the columns and in the same order as the questions were posed in the questionnaire. They were instructed in the guest lecture, but also received paper instructions on how to perform the research. A large effort was made to develop a detailed protocol about the way to carry out the structured interview on the base of the newly developed instrument and some open ended questions, so that the study was carried out in a standardized way.

Each group gathered data from 50 professionals having concrete experience with project work in their professional context. It has to be stressed that this sampling technique results in a “convenience sample”, and does not guarantee that a specific stratification of the population is mirrored in the final sample. All data had to be entered and processed on the base of the pre-structured excel files. All materials, including the paper versions of the questionnaires, were handed in. The data collection process was organized during a period of 5 weeks.

Respondents were told that the responses on this questionnaire would be kept anonymous and that it would take about 15 minutes to complete the questionnaire. They were instructed to fill out the questionnaire, whilst keeping in mind a project they had encountered during work or study in which they had to collaborate with at least two other people in order to achieve an objective and were strongly dependent on these other project members. They were also asked to choose this context based on a large difference in the trustworthiness of the different team members. Their project experience could be positioned in a face to face setting, an online setting or in a mix of these forms.

2.3 Characteristics of the research sample

On the base of the procedure, described in the former section, a data set was obtained from 1180 respondents. Because the questionnaire contained also a number of open questions (e.g. about the organization and job function of the respondent), the legitimacy of the data records was screened (e.g., even up to an analysis of the handwriting). Only four respondents failed to fill out less than 97% of the questionnaire. These records were excluded from further analysis, leaving 1176 respondents.

52% of the respondents were male, 48% female. The minimum age of respondents was 17, the maximum 71 and the mean age was 39, although the majority of respondents fell between 20 and 55 (see figure 2). We observe two broad types of

respondents: advanced students who probably already experienced project work during their study (age group 17 till 29) and employees of professional organizations (age group 30 till 71 (see figure 2). The majority of the respondents belongs to the latter group. Group size of the project teams is reported by 82% of respondents to be between 2 to 13 project team members.

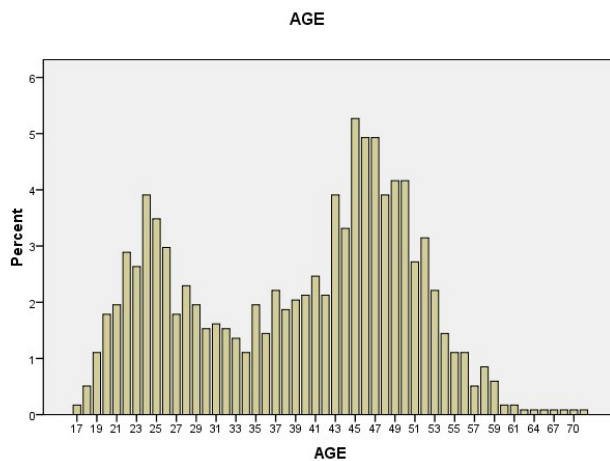


Fig. 2. Age of respondents

2.4 Data Analysis

Reliability of the scale will be assessed by determining the internal consistency of the questionnaire, using Cronbach's alpha or the mean inter-item correlation. Reliability will be considered for each of the clusters of items in the instrument, reflecting the same antecedent.

Additional data analysis is aimed at the validation of concepts (content and construct validity). This will be done by confirmatory factor analysis and structural equation modeling (SEM). We can also compare the scores of the most trustworthy person and least trustworthy person and analyze the nature of observed differences.

3 Conclusion and future work

In the base of an earlier study (Rusman et.al., submitted), we developed an alternative model to the model presented by Mayer, Davis and Schoorman's (1995). Next to a description of this new model and the way it has been operationalized, we described the approach to involve a large scale convenience sample in an empirical test of this model. Current analysis of the available data shed a clear light on the

appropriateness of the respondent group. We will further evaluate the reliability of the instrument and next – and foremost – the structure validity of the instrument. Based on structural equation modeling, it will become possible to analyze the relationships between the antecedents and dependent variables.

In future work we also intend to apply the – empirically tested model - to study the impact of profiling techniques that are hypothesized to foster and support trustworthiness decisions in virtual project teams. We expect that team members with a personal profile will develop in a more rapid way a complete image/impression of trustworthiness and underlying antecedents as compared to team members without a clear profile. We also expect these people to express less extreme judgments about trustworthiness of project team members.

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Appendix 1

Nr.	Reference
1.	(Rotter, 1967)
2.	(Butler, 1991)
3.	(Glaeser, Laibson, Scheinkman, & Soutter, 2000)
4.	(Feng, Lazar, & Preece, 2004)
5.	(Rempel, Holmes, & Zanna, 1985)
6.	(Illes, 2006)
7.	(Hoy, 2003)
8.	(Zolin, Hinds, Fruchter, & Levitt, 2002)
9.	(Johnson-George & Swap, 1982)
10.	(Cummings, Bromiley, Kramer, & Tyler, 1996)
11.	(Rozenaal, 1997)Bromiley, Butler en Cook and Wall)
12.	(Cook & Wall, 1980)
13.	(Jian, Bisantz, & Drury, 1997)
14.	(Kramer, 1999)
15.	(Lagace, 1991)
16.	(Jeanquart-Barone, 1993)
17.	(Larzelere & Huston, 1980)
18.	(Yamagishi, Cook, & Watabe, 1998)
19.	(McKnight, Cummings, & Chervany, 1998)
20.	(Pearce, Sommer, Morris, & Frideger, 1992)
21.	(Sims, Szilagyi, & Keller, 1976)
22.	(Rempel et al., 1985)
23.	(Mayer & Davis, 1999)
24.	(Mayer et al., 1995)
25.	(McAllister, 1995)
26.	(McKnight, Choudhury, & Kacmar, 2002)
27.	(Jiang et al., 2004)
28.	(Gillespie, 2003)
29.	(Bhattacharjee, 2002)
30.	(Kanawattanachai & Yoo, 2005)
31.	(Muir & Moray, 1996)
32.	(Lewicki, Bunker, & Rubin, 1995)
33.	(McAllister, Lewicki & Chaturvedi, 2006)
34.	(Madsen & Gregor, 2000)
35.	(Lewicki, Bunker, Barbara Benedict, Kramer, Roderick, Tyler, 1996)
36.	(Jian, Bisantz, & Drury, 1997)
37.	(EATMP, 2003a)
38.	(Taylor, Shadrake, & Haugh, 1995)
39.	(EATMP, 2003b)
40.	(Wrightsmann, 1991)
41.	(Doyal & Gough, 1991)
42.	(Sheridan, 1988)
43.	(Wheless, 1977)