

# Exploratory and confirmatory factor analysis

[Science](#), [Statistics](#)



Exploratory and Confirmatory Factor Analysis Affiliation Both the confirmatory factor analysis (CFA) and the exploratory factor analysis (EFA) are statistical approaches used in the examination of a measure's internal reliability. This paper looks at the two statistical approaches by comparing and contrasting them as they are used in the article "The Impact of Technostress on Role Stress and Productivity," by Tarafdar, Nathan, & Ragu-Nathan, (2007). The paper describes the survey instrument, the measurement levels, the IVs and DVs nature, model's assumptions, robust of each assumption, computations, the rotation, factors retained, as well as the instrument reliability, and validity among other aspects.

The article makes use of concepts derived socio-technical theory as well as the role theory in an attempt to show the relationship between technostress and productivity. In the article, CFA and EFA approaches are applied in investigating the theoretical constructs and the factors represented in the study about the relationship between technostress and human productivity (Chilton, Hardgrave, & and Armstrong, 2005). The two approaches enhance the hypothesis that the factors used are correlated. Three hypotheses are thus developed. In hypothesis 1, stress comes out as people try to respond to various factors. Hypothesis 2 depicts stress as correlated to the roles of individuals within organizations. Hypothesis 3 also shows a correlation between technology and organization roles (Tarafdar, Nathan, & Ragu-Nathan, 2007). The two approaches are used in accessing the quality of every item used in the study. Both the CFA and the EFA are applied for both confirmatory and exploratory purposes. This aspect is seen in the three hypotheses, which address the three variables differently.

While EFA and CFA are seen to have several similarities in their statistical applications, they greatly contrast in certain ways as well. The use of EFA required that a decision is made on the number of factors applied through an examination of the output from an analysis of principal component (Nygaard & Dahlstrom, 2002). For the article, a five-factor structure is first established to analyze the items. Conversely, the use of CFA requires a specification of the number of factors before the analysis. (Tarafdar, Nathan, & Ragu-Nathan, 2007) Again, the CFA involve the specification of a particular factor structure with an indication of the factor on which each item would load while in the case of EFA, all items load all the factors. In estimating factor loading, maximum likelihood is used, but the maximum likelihood is one of the various estimators applied with EFA. Moreover, in the article CFA makes it possible for the researches to specify the measurement errors, which are correlated (Markus, 2004).

Various assumptions are used in developing the model. The model used assumes that technostress only affects both role stress and productivity. Technostress increases role stress and lowers productivity. The model assumes an inverse relationship between technostress and productivity, but a direct relationship between technostress and role stress (Nygaard & Dahlstrom, 2002). Again, role stress and productivity are inversely related (Chilton, Hardgrave, & and Armstrong, 2005). In this case, role stress is taken as both independent and dependent variable. It is a dependent variable to technostress, but an independent variable to productivity. The rotation aspect of the model makes it difficult to present the case graphically. Besides, one of the variables is used as both an independent

variable and a dependent variable.

The issue of validity is ensured through literature survey findings in identifying the list of items to be used. A pre-pilot study is first conducted to present the first list of items to an end user group. This group has to comment on the items' meanings and their validity. Only four factors were retained for the study because they were the most suitable for the study according to the validation process. The comments were then analyzed as well as the responses. The measurement of item was then revised and set for the actual phase of data collection (Tarafdar, Nathan, & Ragu-Nathan, 2007). The measurement of items was done using a five-point Likert scale. The computation was based on the scale whose values were obtained through coding. For instance, each factor in the Likert scale is assigned a value that is later used in the computation.

In the research, the major ethical concerns include the ethical issues in information systems, the way respondents respond to the questionnaires, and aspect of confidentiality of information. These concerns intertwine with investigation within the organization of choice where some of the respondents may feel that their private spaces are threatened. The same issue is seen from the return rate of 88.3% in the article.

When applying this instrument to new research, it would be good to ensure the consideration of such ethical concerns. Again, it would be advisable to consider more factors and more variable, which can be clearly distinguished as independent or dependent. Besides, an interview could be used in order to gather meaningful qualitative data, which is more suitable for this kind of research. Questionnaires are best applicable in quantitative research. This

would avoid the cyclical aspect of the stress effect on productivity.

## References

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