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Towards a scale for perceptions of mobile interaction: Establishing content and face validity

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Abstract

This paper presents the conceptualization, development, and validation of a new scale measuring perceptions of mobile interaction (PMI). We demonstrate content and face validity of the PMI Scale using subject matter experts (SMEs) and lay experts (LEs). An exploratory validity study has been conducted with 19 SMEs and eight LEs. We calculated the content validity index (CVI), the face validity index (FVI) and an interrater reliability agreement (IRA). The results show twelve constructs that appear to capture and measure PMI. CVI and FVI ranged between Kappa coefficient of .70 and .94 demonstrating content and face validity for the PMI scale. Future research is needed to demonstrate construct validity via exploratory and confirmatory factor analysis.

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1. Introduction

Whilst a number of studies show an impressive growth of m-commerce as well as social network applications use over mobile devices, such as smartphones and tablets, only a few report the factors that make consumers feel comfortable to engage in m-commerce with their mobile device and their feelings and emotions affecting social media usage combined with m-commerce, especially in conjunction with location based services. There is a lack of m-commerce literature, regarding the assessment of consumer perceptions of mobile interactions affecting their mobile purchase behavior. In an attempt to address this gap, this paper presents the conceptualization, development, and validation of a new scale measuring perceptions of mobile interaction (PMI). In specific we demonstrate the procedure and the results of the establishment of the content and face validity of the PMI scale.

According to Netemeyer *et al.* (2003) content validity is the extent to which the items on a measure assess the same content or how well the content material was sampled in the measure. Content validity has been characterized as logical validity. Anastasi (1988) argues content validity should not be confused with face

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validity. Face validity pertains to whether the test "looks valid" to the examinees who take it (p.144). The examinees are panel of experts in both content and face validity. A content validity study employs subject matter experts who evaluate representativeness and comprehensiveness of items capturing a latent construct. On the other hand lay experts comment on ambiguity and clarity of items. Panels of experts can provide their opinions in the form of qualitative comments or they can express their opinions by assigning numbers to criteria that rate items to produce quantitative data. The data is practically derived as the quantification of opinions. This allows the calculation of means, standard deviations, interrater agreement or correlations. The most commonly used statistics is computing Cohen’s Kappa (1960) (a coefficient of agreement for nominal scales).

The paper demonstrates both content and face validity of the PMI Scale, while providing instructions on how to calculate content validity index (CVI), face validity index (FVI) and inter-rater agreement (IRA) in a scale development setting by using both subject matter experts (SMEs) and lay experts (LEs). Using a panel of subject matters and lay experts provide constructive feedback about the quality of the newly developed measure and objective criteria with which to evaluate each item. An initial validity study provides information on the representativeness and clarity of each item. In addition, the expert panel offers concrete suggestions for improving the measure. The revised measure can then be used in pre-test study to assess other psychometric properties.

An exploratory content and face validity study has been conducted with 19 SMEs and eight lay experts, their demographic profiles presented in Appendix 1 and Appendix 2. A data mining software, KH Coder, has been used to populate 19 text documents containing responses to open ended questions. The study employed an exploratory Q-methodology to classify items to categories that capture perceptions of mobile interaction. The results of the categorization reveal twelve constructs that appear to capture and measure PMI. The researchers subjectively factor analyzed 185 items into 15 categories. Six categories reflect factors that make consumers feel comfortable to engage in m-commerce with their mobile devices. Another nine factors identify consumer feelings and emotions associated with social media usage, especially location based services. The results of this study demonstrate content and face validity of a 12 factor PMI scale. Experts rating eliminated 3 factors containing 23 items. Item analysis based on expert rating further removed another set of 23 items via subject matter experts and lay experts.

The contribution of the paper is twofold. On the one hand, it proposes a new scale for perceptions of mobile interaction and demonstrates its face and content validity. At the same time, the paper presents CVI, FVI and IRA validity tests. The study serves as a foundation for further research, with our next step being the preparation of exploratory and confirmatory factor analyses to constructs of the PMI scale.

2. Research method

An exploratory study with 460 respondents from Europe, Asia and Oceania participated provide theoretical definition along with relevant literature pertaining to perceptions of mobile interaction. A data mining software, KH Coder, was used to populate 19 text documents containing responses to open ended questions. A content analysis of these text document produced 185 items. Researchers subjectively factor analysed the items into 15 categories (see Table 1).

Table 1: Factors Associated with PMI Categories

1.	Factors influencing social media using mobile devices
2.	Explanatory factors: social media using mobile devices
3.	Feelings and emotions related to purchase using mobile device
4.	Privacy of mobile device use
5.	Explanatory factors: privacy of mobile device use
6.	Attractions of social media

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7. Feelings and emotions of social media using mobile device
 8. Location based advertising using social media and m-commerce
 9. Trust: m-commerce website
 10. Factors encouraging m-commerce website revisit
 11. Factors discouraging m-commerce website revisit
 12. Factors related to loyalty of m-commerce website
 13. Attributes of ideal m-commerce website
 14. Explanatory factors: ideal m-commerce website
 15. Factors to staying longer on social media website
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In this study we employed 19 subject matter experts from mainly marketing and information systems discipline and 8 lay experts with varying demographic profile. Davis (1992) suggests that the criteria for selecting a panel of experts are the number of publications or the work experience and the Les are people for whom the topic is most salient. SMEs ensure that the population for whom the measure is being developed is represented. The lay group addresses issues such as phrasing of unclear terms and recommends other important or salient items. Grant and Davis (1997) suggest the number of panel experts is at least three experts for each group (professionals and lay experts) with a range up to 20 whereas Gable and Wolf (1993) suggest more than 20 SMEs.

After identifying potential panel members, an email attachment containing face validity document were sent to subject matter and lay experts. The email included the purpose of the study, the reason for which the experts were selected, a description of the measure and its scoring, and an explanation of the response format. We used two criteria to evaluate each item: 1) clarity of the item 2) representativeness and comprehensiveness of the content domain. This addressed whether items were well-written, and at an appropriate reading level for target individuals who use mobile devices for various purposes, including social networking, and m-commerce. The clarity of each of the 185 items was evaluated via rating on a 5 point Likert type scale (1=totally not understandable, 2= not understandable, 3= neutral, 4= understandable and 5= totally understandable). Both groups, subject matter and lay experts, rated the scale for clarity. Subject matter experts were also asked to evaluate the level of representativeness and comprehensiveness of the content domain of the measure. In specific, SMEs were requested to write comments on how well the items represents the conceptual domain and were asked to identify items they would recommend to be included, modified or deleted.

3. Data Analysis

Three types of analyses were performed. First, interrater agreement (IRA) was assessed to determine the extent to which the experts are reliable in their ratings. The middle value 3 was excluded from the analysis and the scale was dichotomized, with values one and two combined and values four and five combined. This method is consistent with the literature on conducting content validity studies (for example, Davis, 1992; Grant & Davis, 1997). The data was dichotomized so that the researcher can assess the extent to which the experts agree that the item is understandable or not. The original five-point Likert scale allowed calculating descriptive statistics, e.g. mean and mode statistics, providing information for the researcher to determine the extent to which an item needs to be retained, modified or deleted. We calculated frequency/count employing SPSS version 11 to count items that experts rated one or two and the items that are rated four or five. An IRA was calculated for each item as well as for the scale. Next we calculated Content Validity Index (CVI). We computed the CVI for each item by counting the number of experts who rated the item as four and five and divided that number by the total number of experts. The CVI for the measures was estimated by calculating the average CVI across the items. Davis (1992) recommends a CVI of .80 for each measure.

4. Results

We computed the Interrater Agreement (IRA) for 185 items (counting the number of items that have an IRA of at least .80 and dividing that number by the total number of items). This method suggests interrater agreement of .75. This approach is recommended for studies with more than 20 SMEs (Lynn, 1986). We grouped each expert’s scores according to their identity. Therefore, we had two columns of weighted average of scores of PMI items from subject matter expert (SMEs) and lay experts (LEs). The results in Table 2 show a strong Kappa coefficient of .79, $p < .0001$ between two expert groups, when all items were taken together.

Table 2: Kappa coefficient of .79 between two expert groups

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Measure of Agreement	Kappa	.79	.039	5.942	.000
N of Valid Cases		185			

5. Validity Index

To compute the content validity index (CVI) and the face validity index (FVI) for each item, we sorted expert responses that were rated as understandable (with code 2) in our analysis. The number of counts for the “understandable” category were summed and divided by the total number of experts. This process was followed to compute the CVI for each of the 185 items of the PMI scale, using SME’s ratings and the FVI was computed using lay expert responses. In the second stage we computed an average CVI and FVI index for each construct of the PMI Scale (average of item scores divided by number of items) (see Table 3). All constructs of PMI pass the minimum of Kappa coefficient of 0.7 agreement as suggested by Bakeman and Gottman, 1997, except three constructs, containing 23 items, which failed on both CVI and FVI index (see Table 3). When we assessed individual item ratings within the constructs it was revealed that two of the five items were poorly rated by both experts and novice groups, e.g. “I am worried when I buy using my mobile”. These two items are candidate for deletion. The constructs --privacy of mobile device use and their explanatory factor rated poorly in CVA and FVI rating whereas attractions of social network just missed. Next we assessed each item individually based on SME and LE ratings. CVI for 46 items were between Kappa .192 and .690, below the required minimum of Kappa 0.7. The two groups of experts (SMEs and LEs) achieved 100% agreement on the decision that 32 items were not understandable=1. 9 items were eliminated solely via SMEs recommendation for deletion and 5 items were deleted based on LEs recommendation. This process resulted in a 139 final pool of PMI scale items. After eliminating poorly performing items based on CVI and FVI, the remaining 139 items of the PMI scale show a high Kappa coefficient ranging between .80 and 1.0. These 139 items of the 12 factors represent better the PMI content domain. As shown by the results in Table 3, the PMI scale demonstrates content and face validity.

Table 3: Subject Matter and Lay Expert rating of PMI scale’s item clarity

Sample Items	Content Validity Index (CVI)	Face Validity Index (FVI)
1.Factors influencing social media using mobile devices (N=7) A social media via mobile is easier than via laptop A social media via mobile is faster than via laptop I use social media to stay in touch with friends and family	.80	.79

<p>2.Explanatory factors: social media using mobile devices (N=10) A social network is similar from my mobile phone and from my laptop/desktop I find it easier to use a social network from my mobile phone when I am outdoor Using a social network from my mobile device looks more secure</p>	.79	.79
<p>3.Feelings and emotions related to purchase using mobile device (N=24) I am worried when I buy using my mobile I am excited when I buy from my mobile I feel more confident when I buy on my mobile than on my laptop/desktop</p>	.76	.73
<p>4.Privacy of mobile device use (N=5) I am concerned about my privacy because it is a personal item Buying on a mobile is safe for my privacy I feel concerned about my privacy because of the debit/credit card</p>	.59	.55
<p>5. Explanatory factors: privacy of mobile device use (N=5) I feel different about my privacy via mobile as it is secure I feel different about my privacy via mobile as it is anonymous I feel different about my privacy via mobile as it is mobile</p>	.32	.43
<p>6. Attractions of social media (N=13) A Social media that is secure to interact A social network enabling audio-visual content An entertaining social network is rich, captivating and pleasant to interact</p>	.61	.58
<p>7. Feelings and emotions of social media using mobile device (N=21) I am happy when I use a social network on my mobile I feel more comfortable when I use my social network on my mobile I feel excited when using my social network on my mobile</p>	.77	.71
<p>8. Location based advertising using social media and m-commerce (N=13) I like companies tracking my location I like companies offering discounts for purchase on mobile commerce. I prefer that companies tailor product/service to my need</p>	.82	.88
<p>9. Trust: m-commerce website (N=11) Appearance makes me trust an m-commerce website Word of mouth makes me trust an m-commerce website Reviews from other users and experts makes me trust an m-commerce website</p>	.82	.82
<p>10. Factors encouraging m-commerce website revisit (N=15) A simple website encourages me to revisit it on my mobile A secure website encourages me to revisit it on my mobile An interesting website encourages me to revisit it on my mobile</p>	.87	.86
<p>11. Factors discouraging m-commerce website revisit (N=12) A cheap (design) website discourages me to revisit it on my mobile An awkward website discourages me to revisit it on my mobile A hard to understand website discourages me to revisit it on my mobile</p>	.89	.80
<p>12. Factors related to loyalty of m-commerce website (N=2) The services available encourage me to revisit the latter on my mobile The absence of advertising encourages me to revisit Its design encourages me to revisit a particular website on my mobile</p>	.94	.88
<p>13. Attributes of ideal m-commerce website (N=8) A website with a lot of choices is an ideal m-commerce website A nice looking design is an ideal m-commerce website A website with a lot of content is an ideal m-commerce website</p>	.86	.83
<p>14. Explanatory factors: ideal m-commerce website (N=23) The clarity of the m-commerce website makes it ideal for me The convenience of the m-commerce website makes it ideal for me The performance of the m-commerce website makes it ideal for me</p>	.85	.83
<p>15. Factors to staying longer on social media website (N=16) I spend more time on a social network than on another if I can talk to my friends</p>	.82	.86

I spend more time on a social network than on another if it is fun		
I spend more time on a social network than on another if my network is on the latter		

6. Conclusion

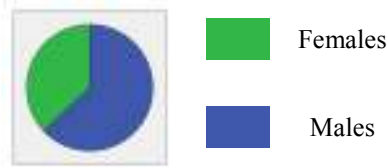
This paper presents the initial phase of developing a new scale for measuring perceptions of mobile interaction (PMI). An initial scale of 139 items grouped in 12 constructs is presented after establishing content and face validity. The paper demonstrates how to conduct a content and face validity study, a crucial step in scale development. An expert panel was used to evaluate a new measure. The experts assessed the measure to determine the representativeness and clarity of the items, the factor with which each item is associated, and the extent to which the measure is comprehensive. We have presented the first step for the development of a valid and reliable scale. The current study shows that the 12-factor PMI scale demonstrates content and face validity. The subsequent analyses should include evaluating the reliability (such as internal consistency and test-retest) and construct validity through exploratory and confirmatory factor analysis. As our next step towards this direction, we intend to conduct a pretest study to further evaluate the items in order to refine the PMI constructs via exploratory factor analysis. Davis (1992) suggests that an initial pool of items for a scale that has demonstrated content and face validity would need fewer revisions in the final phase of scale development. Having established the content and face validity of our scale is thus expected to facilitate us in developing a highly reliable and valid measure of perceptions of mobile interaction.

References

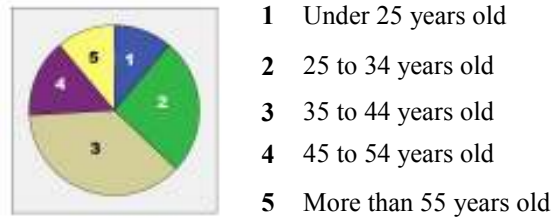
- Anastasi, A. (1988). *Psychological testing*. New York, NY: Macmillan.
- Bakeman, R., & Gottman, J. M. (1997). Assessing observer agreement. In *Observing interaction: An introduction to sequential analysis* (2nd Ed., pp. 56-80). New York: Cambridge University Press.
- Cohen, J. (1960). "A coefficient of agreement for nominal scales". *Educational and Psychological Measurement* 20 (1): 37–46
- Davis, L. (1992). Instrument review: Getting the most from your panel of experts. *Applied Nursing Research*, 5, 194-197.
- Grant, J. S., & Davis, L. L. (1997). Selection and use of content experts for instrument development. *Research in Nursing & Health*, 20, 269-274.
- Gable, R. K., & Wolf, J. W. (1993). *Instrument development in the affective domain: Measuring attitudes and values in corporate and school settings*. Boston: Kluwer Academic.
- Lynn, M. (1986). Determination and quantification of content validity. *Nursing Research*, 35, 382-385.
- Van der Geer, J., Hanraads, J. A. J., & Lupton R. A. (2000). The art of writing a scientific article. *Journal of Scientific Communications*, 163, 51 - 59.
- Strunk, W., Jr., & White, E. B. (1979). *The elements of style*. (3rd Ed.). New York: Macmillan, (Chapter 4).
- Mettam, G. R., & Adams, L. B. (1994). How to prepare an electronic version of your article. In B. S. Jones, & R. Smith Z. (Eds.), *Introduction to the electronic age* (pp. 281-304). New York: E-Publishing Inc.

Appendix A. Sample description

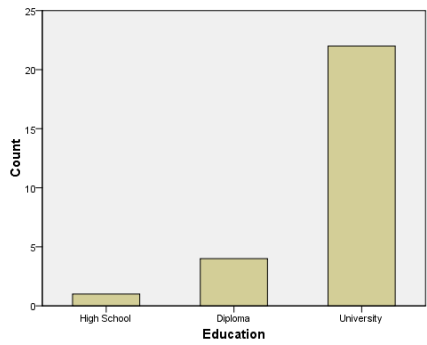
Gender:



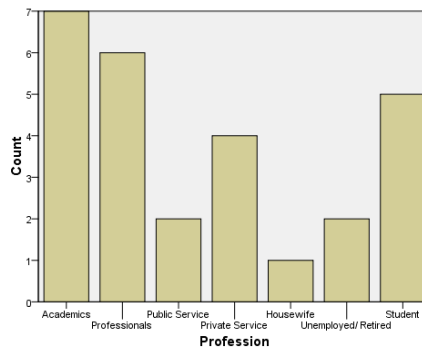
Age:



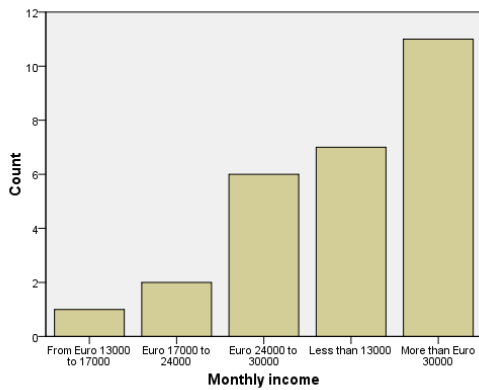
Education:



Profession:



Monthly income:



Nationality:

