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RESEARCH ARTICLE

MOBILE APPLICATION USABILITY: CONCEPTUALIZATION AND INSTRUMENT DEVELOPMENT

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Appendix A

Content Validity Check and Pretest: Respondent Demographics

		Content Validity Check		Pretest	
Demographic	**Category**	**n = 318**	**%**	**n = 440**	**%**
Gender	Men	179	56	236	53.6
	Women	139	44	204	46.4
Age groups	Under 20	48	15	45	10.2
	20-29	210	66	305	69.3
	30-39	54	17	70	15.9
	40-49	4	1	16	3.6
	50-59	0	0	3	.7
	60 or older	2	1	1	.2
Income (Annual, in USD)	0-10,000	38	12	37	8.4
	10,000-19,000	42	13	56	12.7
	20,000-29,000	40	13	46	10.5
	30,000-39,000	41	13	53	12
	40,000-49,000	28	9	37	8.4
	50,000-74,000	44	14	70	15.9
	75,000-99,000	43	14	56	12.7
	100,000-150,000	30	9	28	6.4
	Over 150,000	12	4	57	13
Job	ICT	37	12	69	15.7
	Banking and Finance	12	4	13	3
	Insurance, Real Estate and Legal	3	1	5	1.1
	Government and Military	6	2	11	2.5
	Medical Healthcare	0	0	3	0.7
	Construction and Engineering	10	3	11	2.5
	Retail and Wholesale	1	0	5	1.1
	Education	17	5	28	6.4
	Marketing and Advertising	18	6	31	7.0
	Student	167	53	162	36.8
	Other	47	15	102	23.2

Appendix B

Proportion of Substantive Agreement and Substantive Validity Coefficients Based on the Content Validity Survey

Construct Name	Label	PSA	CSV	Construct Name	Label	PSA	CSV	Construct Name	Label	PSA	CSV
Branding	BRAN1	.87	.82	Aesthetic graphics	AEST1	.92	.87	Concise language	CLAN1	.78	.66
	BRAN2	.87	.83		AEST2	.89	.83		CLAN2	.88	.83
	BRAN3	.89	.85		AEST3	.93	.88		CLAN3	.80	.69
	BRAN4	.89	.83		AEST4	.91	.85		CLAN4	.80	.69
Data preservation	DAPR1	.60	.87	Realism	REAL1	.87	.80	Short icon labeling	ICOL1	.43	.05
	DAPR2	.89	.86		REAL2	.89	.82		ICOL2	.41	-.01
	DAPR3	.90	.86		REAL3	.89	.82		ICOL3	.35	-.14
	DAPR4	.68	.56		REAL4	.90	.84		ICOL4	.25	-.43
Instant start	STAR1	.88	.83	Subtle animation	SANM1	.79	.75	Standardized user-interface element	SUI1	.91	.86
	STAR2	.74	.63		SANM2	.91	.88		SUI2	.90	.84
	STAR3	.88	.85		SANM3	.92	.89		SUI3	.89	.83
	STAR4	.88	.84		SANM4	.92	.89		SUI4	.90	.83
Orientation	ORIE1	.89	.85	Control obviousness	COOB1	.89	.84	User-centric terminology	UCT1	.87	.81
	ORIE2	.87	.82		COOB2	.76	.58		UCT2	.89	.84
	ORIE3	.90	.85		COOB3	.89	.85		UCT3	.89	.84
	ORIE4	.89	.82		COOB4	.81	.66		UCT4	.88	.84
Collaboration	COLL1	.85	.75	De-emphasis of user settings	DUS1	.91	.86	Logical path	LP1	.91	.85
	COLL2	.90	.84		DUS2	.90	.85		LP2	.82	.76
	COLL3	.88	.81		DUS3	.91	.86		LP3	.83	.76
	COLL4	.89	.85		DUS4	.87	.92		LP4	.82	.76
Content relevance	CRLV1	.77	.63	Effort minimization	EMM1	.86	.80	Top-to-bottom structure	TTPS1	.85	.76
	CRLV2	.61	.34		EMM2	.92	.87		TTPS2	.61	.37
	CRLV3	.82	.70		EMM3	.88	.83		TTPS3	.65	.42
	CRLV4	.49	.09		EMM4	.72	.59		TTPS4	.85	.79
Search	SEAR1	.89	.85	Fingertip-size controls	FTSC1	.89	.84		TTPS5	.68	.53
	SEAR2	.90	.86		FTSC2	.89	.84		TTPS6	.82	.73
	SEAR3	.87	.82		FTSC3	.91	.87				
	SEAR4	.90	.85		FTSC4	.64	.46				

Appendix C

Initial Item Pool Created Based on the Analysis of the Content Validity Check

AEST1	The mobile application uses beautiful artwork.
AEST2	The mobile application uses rich, beautiful, and engaging graphics that draw you into the application.
AEST3	The mobile application uses stunning graphics.
AEST4	The mobile application benefits from beautiful and engaging graphics.
BRAN1	The mobile application uses brand colors or images in a refined and unobtrusive way.
BRAN2	The mobile application doesn't force me to watch an advertisement.
BRAN3	The mobile application quietly reminds you of the brand that runs the application.
BRAN4	The mobile application integrates branding effectively.
CLAN1	The mobile application uses as few words as possible without losing the meaning.
CLAN2	The mobile application uses concise language.
CLAN3	The mobile application brings the main message across in a few words.
CLAN4	The mobile application uses precise and concise text.
COLL1	The mobile application helps you to share information with other people.
COLL2	The mobile application allows you to connect with other people.
COLL3	The mobile application supports collaboration with others.
COLL4	The mobile application helps you to interact with others.
COOB1	The mobile application makes the main function of the application immediately apparent.
COOB2	The mobile application uses intuitive commands.
COOB3	The mobile application uses controls that are immediately obvious.
COOB4	The mobile application employs controls that are intuitive.
CRLV1	The mobile application emphasizes the content you want to find.
CRLV2	The mobile application emphasizes the content that is important to you.
CRLV3	The mobile application emphasizes the content you care about.
CRLV4	The mobile application elevates the content that is relevant to you.
DAPR1	The mobile application automatically saves your data when you close the application.
DAPR2	The mobile application doesn't require you to manually save your data when you quit the application.
DAPR3	The mobile application saves the data automatically and you can re-start where you left previously.
DAPR4	The mobile application allows you to quit the application and restart at the same stage when re-entering it.
DUS1	The mobile application avoids setting up user preferences within the application.
DUS2	The mobile application de-emphasizes user settings.
DUS3	The mobile application doesn't prompt you to change user settings within the application.
DUS4	The mobile application doesn't request you to modify the user setting within the application.
EMM1	The mobile application makes it easy for you to input your choice.
EMM2	The mobile application minimizes effort for you to type in information.
EMM3	The mobile application offers you fields to choose from so that you don't have to type in text.
EMM4	The mobile application allows me to perform tasks without having to input data.
FTSC1	The mobile application uses fingertip-size controls.
FTSC2	The mobile application makes use of fingertip-size buttons.
FTSC3	The mobile application uses large-size controls.
FTSC4	The mobile application uses small controls that require you to aim carefully before you tap it.
LP1	The mobile application gives users a logical path to follow.
LP2	The mobile application follows a logical path.
LP3	The mobile application provides users a logical path to follow.
LP4	The mobile application uses a predictable path.
ORIE1	The mobile application doesn't prompt you to change the orientation of the screen (move the device).

ORIE2	The mobile application works well independent of how you hold your mobile device.
ORIE3	The mobile application flips the content over if you change the orientation of the device (horizontal/vertical).
ORIE4	The mobile application works well independent of whether you hold your device horizontally or vertically.
REAL1	The mobile application uses realistic icons or pictures (e.g., trashcan) to help you understand the functions better.
REAL2	The mobile application helps you to understand functions by labeling them with realistic icons or pictures (e.g., trashcan).
REAL3	The mobile application uses real-life icons or pictures to illustrate the functionality (e.g., trashcan for deleting items).
REAL4	The mobile application uses realistic icons or pictures (e.g., trashcan) to get the message across.
SANM1	The mobile application uses animations effectively to communicate content.
SANM2	The mobile application uses animations appropriately.
SANM3	The mobile application doesn't overuse animations.
SANM4	The mobile application uses subtle animation to communicate content.
SEAR1	The mobile application narrows down the results as you are typing, when searching for information.
SEAR2	The mobile application helps you to search for information via a search bar.
SEAR3	The mobile application displays a search bar when you have to look for information.
SEAR4	The mobile application makes searching for information easy.
STAR1	The mobile application launches quickly and allows you to instantly start using it.
STAR2	The mobile application takes a lot of time to open.
STAR3	The mobile application doesn't require much time to open.
STAR4	The mobile application is instantly "ready to go" right after switching it on.
SUI1	The mobile application has buttons and icons that are similar to other applications.
SUI2	The mobile application has buttons and icons that I have used in other applications.
SUI3	The mobile application uses buttons and icons that you have seen in other applications.
SUI4	The mobile application uses standard icons that you already know from other applications.
TTPS1	The mobile application puts the most frequently used information near the top.
TTPS2	The mobile application displays the most important information on the top of the screen.
TTPS3	The mobile application lists the most essential information on the top of the screen.
TTPS4	The mobile application lists the most frequently used operations at the very top.
TTPS5	The mobile application arranges the least often used operation on the bottom.
TTPS6	The mobile application places the most frequently used operation at the top.
UCT1	The mobile application uses terminology that you understand.
UCT2	The mobile application avoids technical jargon.
UCT3	The mobile application doesn't use technical terms.
UCT4	The mobile application uses terminology that is comprehensible.

Appendix D

Model Fit for Pretest, Study 1 and Study 2

	Pretest	Study 1	Study 2
GFI (≥ .90)	.92	.93	.94
RMSEA (≤ .06)	.05	.04	.04
SRMR (≤ .08)	.06	.05	.05
CFI (≥ .95)	.96	.96	.97
NFI (≥ .90)	.92	.92	.93
TLI (≥ .80)	.87	.91	.88

Appendix E

Pretest: Reliabilities, AVEs, and Correlations

	Cron.α	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	NA	NA	NA	NA										
2. Age	NA	NA	NA	-.13*	NA									
3. Income	NA	NA	NA	.17**	.15*	NA								
4. Application design	.82	4.71	1.55	-.13*	-.12*	.05	.74							
5. Application utility	.85	4.42	1.38	-.15*	-.13*	.04	.16*	.73						
6. User interface graphics	.82	4.17	1.28	-.12*	-.12*	.07	.07	.10	.75					
7. User interface input	.84	4.20	1.30	-.15*	-.16*	.02	.05	.07	.19**	.77				
8. User interface output	.75	4.34	1.32	-.14*	-.19**	.05	.04	.05	.20**	.19**	.80			
9. User interface structure	.77	4.57	1.28	-.13*	-.07	.02	.08	.08	.15*	.20**	.17**	.73		
10. Mobile application loyalty	.80	4.99	1.60	.15*	.05	.08	.40***	.35***	.20**	.13*	.12*	.10	.70	
11. Continued intention to use	.75	5.07	1.71	-.07	-.14*	.04	.44***	.37***	.38***	.20**	.30***	.35***	.38***	.71

*p < 0.05, **p < 0.01, and ***p < 0.001

Appendix F

Pretest: Unique Proportion of Variance in the Second-Order Construct Explained by Each First-Order Construct

Second-Order Construct	First-Order Construct	R^2	Fornell and Larcker's Construct Reliability Index
Application design	Branding	.06	.87
	Data preservation	.08	.86
	Instant start	.07	.82
	Orientation	.05	.82
Application utility	Collaboration	.06	.89
	Content relevance	.35	.83
	Search	.05	.81
User interface graphics	Aesthetic graphics	.14	.84
	Realism	.10	.81
	Subtle animation	.17	.81
User interface input	Control obviousness	.03	.83
	De-emphasis of user settings	.05	.79
	Effort minimization	.11	.84
	Fingertip-size control	.07	.83
User interface output	Concise Language	.03	.82
	Standardized user interface element	.05	.80
	User-centric terminology	.08	.79
User interface structure	Logical path	.08	.77
	Top-to-bottom structure	.14	.80

Appendix G

Pretest: Item Loadings and Weights

Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order
First-Order Constructs											
Branding (BRAN1-4)	0.71	0.84	.35***	Aesthetic graphics (AEST1-4)	0.77	0.88	.43***	Concise language (CLAN1-4)	1.04	0.87	.25***
	0.74	0.91			0.73	0.84			1.09	0.85	
	0.78	0.82			0.85	0.75			1.20	0.79	
	0.73	0.92			1.07	0.88			0.83	0.75	
Data preservation (DAPR1-4)	1.00	0.82	.35***	Realism (REAL1-4)	0.77	0.84	.37***	Standardized user-interface element (SUI1-4)	0.91	0.75	.33***
	0.85	0.84			0.75	0.83			1.02	0.78	
	0.87	0.88			0.68	0.80			1.03	0.80	
	1.01	0.89			0.73	0.75			0.85	0.84	
Instant start (STAR1-4)	1.02	0.78	.29***	Subtle animation (SANM1-4)	1.05	0.69	.44***	User-centric terminology (UCT1-4)	1.03	0.65	.29***
	1.05	0.79			0.86	0.88			0.87	0.83	
	1.02	0.83			0.85	0.84			0.78	0.84	
	1.00	0.84			0.89	0.82			0.89	0.78	
Orientation (ORIE1-4)	1.01	0.92	.35***	Control obviousness (COOB1-4)	1.04	0.79	.22***	Logical path (LP1-4)	1.05	0.75	.38***
	1.04	0.84			1.09	0.82			1.03	0.77	
	0.86	0.77			1.18	0.84			1.04	0.78	
	0.89	0.73			1.04	0.83			0.83	0.73	
Collaboration (COLL1-4)	0.74	0.86	.34***	De-emphasis of user settings (DUS1-4)	1.05	0.80	.28***	Top-to-bottom structure (TTPS1-6)	1.03	0.84	.43***
	0.73	0.93			0.87	0.83			1.05	0.93	
	0.83	0.86			0.77	0.83			0.82	0.68	
	0.85	0.91			0.72	0.66			0.84	0.77	
Content relevance (CRLV1-4)	1.02	0.82	.67***	Effort minimization (EMM1-4)	1.02	0.83	.44***		1.04	0.73	
	0.88	0.84			0.89	0.86			1.02	0.80	
	0.83	0.83			0.89	0.82					
	1.02	0.80			1.05	0.83					
Search (SEAR1-4)	1.02	0.82	.29***	Fingertip-size controls (FTSC1-4)	0.82	0.84	.31***				
	0.89	0.87			0.89	0.87					
	0.80	0.78			0.93	0.78					
	0.74	0.73			0.94	0.79					
Second-Order Constructs											
Application design (DES1-4)	1.02	0.84	NA	User interface graphics (INTG1-4)	1.02	0.78	NA	User interface output (CONT1-4)	0.80	0.80	NA
	1.03	0.83			1.00	0.82			0.80	0.80	
	0.88	0.93			0.84	0.84			1.00	0.80	
	0.84	0.80			0.87	0.83			1.00	0.80	
Application utility (PURP1-4)	0.85	0.82	NA	User interface input (INP1-4)	1.03	0.78	NA	User interface structure (STRU1-4)	0.70	0.80	NA
	0.91	0.80			1.05	0.83			1.00	0.70	
	0.92	0.84			0.78	0.74			1.10	0.70	
	1.03	0.78			0.82	0.73			1.00	0.80	

*p < 0.05, **p < 0.01, and ***p < 0.001

Appendix H

Study 1 and Study 2: Respondent Demographics

		Study 1		Study 2	
Demographic	**Category**	**n = 408**	**%**	**n = 412**	**%**
Gender	Men	280	68.6	275	66.7
	Women	128	31.4	137	33.3
Age groups	Under 20	42	10.3	40	9.7
	20-29	140	34.3	144	35.0
	30-39	101	24.8	103	25.0
	40-49	74	18.1	70	17.0
	50-59	25	6.1	29	7.0
	60 or older	26	6.4	26	6.3
Income (Annual, in USD)	0-10,000	12	2.9	10	2.4
	10,000-19,000	58	14.2	60	14.6
	20,000-29,000	70	17.2	77	18.7
	30,000-39,000	30	7.4	23	5.6
	40,000-49,000	20	4.9	20	4.9
	50,000-74,000	25	6.1	26	6.3
	75,000-99,000	125	30.6	120	29.1
	100,000-150,000	40	9.8	44	10.7
	Over 150,000	28	6.9	32	7.8
Job	ICT	70	17.2	65	15.8
	Banking and Finance	22	5.4	20	4.9
	Insurance, Real Estate and Legal	28	6.9	25	6.1
	Government and Military	40	9.8	42	10.2
	Medical Healthcare	35	8.6	37	9.0
	Construction and Engineering	22	5.4	25	6.1
	Retail and Wholesale	40	9.8	41	10.0
	Education	12	2.9	15	3.6
	Marketing and Advertising	17	4.2	19	4.6
	Student	48	11.8	50	12.1
	Other	74	18.1	73	17.7
Social media preference	Facebook	210	51.5	206	50
	LinkedIn	130	31.9	128	31.1
	Twitter	30	7.4	35	8.5
	My Space	18	4.4	19	4.6
	Google+	20	4.9	24	5.8
Access to mobile sites	Application on phone	370	90.7	372	90.3
	Web browser	38	9.3	40	9.7
Primary phone use	iPhone	220	53.9	225	54.6
	BlackBerry	70	17.2	69	16.7
	Android	44	10.8	42	10.2
	Windows Mobile	28	6.9	26	6.3
	Symbian	12	2.9	11	2.7
	Other	34	8.3	39	9.5

Appendix I

Construct Definitions and MUG Scales Used by Venkatesh and Ramesh (2006)

Construct	Definition	Items Used
Content	"assesses the informational and transactional capabilities of a mobile application"	Overall, the mobile social media application offers content that is relevant to the core audience.
		The mobile social media application uses media appropriately and effectively to communicate the content.
		I think that the mobile social media application provides the appropriate breadth and depth of content.
		In general, the mobile social media application provides current and timely information.
Ease of use	"relates to the cognitive effort required in using a mobile application"	The mobile social media application offers clear and understandable goals.
		Overall, the mobile social media application is well structured and organized.
		The mobile social media application provides clear and understandable results and feedback regarding your progress.
Emotion	"taps into affective reactions invoked by a Web site"	The mobile social media application offers you an element of challenge.
		The mobile social media application provides an interesting story line.
		The mobile social media application ties to individuals, within and outside the organization, who have credibility.
		The mobile social media application allows you to control the flow of information.
Made-for-the-medium	"relates to tailoring a Web site to fit a particular user's needs"	The mobile social media application offers you the opportunity to be part of an online group or community.
		The mobile social media application treats you as a unique person and respond to your specific needs.
		The mobile social media application reflects the most current trend(s) and provides the most current information.
Promotion	"captures the advertising of a Web site on the Internet and other media"	The mobile social media application understands to incorporate advertisements.

Reference

Venkatesh, V., and Ramesh, V. 2006. "Web and Wireless Site Usability: Understanding Differences and Modeling Use," *MIS Quarterly* (30:1), pp. 181-206.

Appendix J

Study 1: Construct Reliability and Correlation Matrix

	Cron .α	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	NA	NA	NA	NA										
2. Age	NA	NA	NA	-.14*	NA									
3. Income	NA	NA	NA	.20**	.16*	NA								
4. Application design	.80	4.74	1.50	-.13*	-.13*	.04	.73							
5. Application utility	.82	4.44	1.28	-.08	-.07	.03	.20**	.71						
6. User interface graphics	.83	4.28	1.30	-.13*	-.05	.05	.04	.07	.74					
7. User interface input	.77	4.30	1.31	-.16*	-.17**	.01	.02	.02	.20**	.75				
8. User interface output	.75	4.37	1.30	-.10	-.20**	.04	.03	.05	.22***	.21**	.77			
9. User interface structure	.73	4.61	1.30	-.07	-.08	.01	.07	.07	.14*	.22***	.19**	.72		
10. Mobile application loyalty	.75	5.04	1.51	.16*	.06	.05	.44***	.39***	.22***	.15*	.13*	.07	.71	
11. Continued intention to use	.78	4.98	1.59	-.08	-.17**	.02	.43***	.37***	.40***	.22***	.32***	.38***	.40***	.74

*p < 0.05, **p < 0.01, and ***p < 0.001

Appendix K

Study 1: Unique Proportion of Variance in the Second-Order Construct Explained by Each First-Order Construct

Second-Order Construct	First-Order Construct	R^2	Fornell and Larcker's Construct Reliability Index
Application design	Branding	.06	.87
	Data preservation	.09	.88
	Instant start	.08	.82
	Orientation	.06	.83
Application utility	Collaboration	.06	.87
	Content relevance	.34	.86
	Search	.05	.80
User interface graphics	Aesthetic graphics	.12	.86
	Realism	.10	.83
	Subtle animation	.17	.81
User interface input	Control obviousness	.02	.84
	De-emphasis of user settings	.06	.80
	Effort minimization	.12	.84
	Fingertip-size control	.07	.82
User interface output	Concise Language	.03	.81
	Standardized user interface element	.06	.83
	User-centric terminology	.07	.78
User interface structure	Logical path	.08	.78
	Top-to-bottom structure	.14	.80

Appendix L

Study 1: Item Loadings and Weights

Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order
First-Order Constructs											
Branding (BRAN1-4)	0.74	.88	.33***	Aesthetic graphics (AEST1-4)	0.80	.89	.40***	Concise language (CLAN1-4)	1.05	.83	.24***
	0.78	.87			0.78	.84			1.03	.85	
	0.80	.80			0.83	.78			1.17	.78	
	0.77	.91			1.10	.90			0.85	.76	
Data preservation (DAPR1-4)	1.03	.87	.34***	Realism (REAL1-4)	0.79	.83	.34***	Standardized user-interface element (SUI1-4)	0.88	.78	.32***
	0.87	.85			0.74	.88			0.84	.79	
	0.88	.91			0.65	.82			1.05	.83	
	1.04	.89			0.78	.77			0.88	.88	
Instant start (STAR1-4)	1.03	.79	.26***	Subtle animation (SANM1-4)	1.02	.65	.40***	User-centric terminology (UCT1-4)	1.01	.64	.25***
	1.02	.80			0.83	.89			0.89	.82	
	1.03	.82			0.83	.84			0.79	.83	
	0.82	.85			0.88	.85			0.80	.79	
Orientation (ORIE1-4)	1.04	.90	.33***	Control obviousness (COOB1-4)	1.05	.82	.26***	Logical path (LP1-4)	0.93	.75	.35***
	1.00	.88			1.02	.83			1.04	.79	
	0.88	.80			1.10	.85			1.03	.80	
	0.91	.74			1.04	.83			0.89	.75	
Collaboration (COLL1-4)	0.73	.83	.33***	De-emphasis of user settings (DUS1-4)	1.09	.83	.31***	Top-to-bottom structure (TTPS1-6)	1.07	.80	.40***
	0.74	.91			0.80	.85			1.03	.91	
	0.85	.85			1.02	.85			0.80	.65	
	0.88	.87			0.75	.62			0.82	.73	
Content relevance (CRLV1-4)	1.06	.85	.58***	Effort minimization (EMM1-4)	1.05	.85	.37***		1.00	.79	
	0.89	.88			0.85	.84			1.00	.84	
	0.85	.89			0.88	.83					
	1.04	.83			1.04	.82					
Search (SEAR1-4)	1.02	.81	.31***	Fingertip-size controls (FTSC1-4)	0.84	.83	.30***				
	0.83	.83			0.91	.85					
	0.89	.77			0.95	.79					
	0.75	.78			0.97	.80					
Second-Order Constructs											
Application design (DES1-4)	1.05	.83	NA	User interface graphics (INTG1-4)	1.00	.80	NA	User interface output (CONT1-4)	0.82	.78	NA
	1.04	.82			1.04	.81			0.77	.80	
	0.85	.91			0.83	.83			1.03	.78	
	0.83	.77			0.85	.82			1.00	.74	
Application utility (PURP1-4)	0.89	.84	NA	User interface input (INP1-4)	1.02	.70	NA	User interface structure (STRU1-4)	0.77	.80	NA
	0.89	.83			1.01	.82			1.03	.78	
	0.90	.82			0.84	.80			1.03	.77	
	1.05	.77			0.84	.76			1.01	.80	

*p < 0.05, **p < 0.01, and ***p < 0.001

Appendix M

Study 2: Construct Reliability and Correlation Matrix

	Cron.α	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Gender	NA	NA	NA	NA										
2. Age	NA	NA	NA	-.07	NA									
3. Income	NA	NA	NA	-.13*	.14*	NA								
4. Application design	.77	4.84	1.42	-.05	-.10	.10	.70							
5. Application utility	.75	4.35	1.30	-.07	-.04	.05	.22***	.74						
6. User interface graphics	.74	4.20	1.32	-.05	-.03	.07	.05	.04	.72					
7. User interface input	.78	4.41	1.28	-.07	-20**	.02	.07	.02	.24***	.71				
8. User interface output	.80	4.30	1.25	-.02	-.20**	.01	.08	.07	.24***	.22***	.70			
9. User interface structure	.82	4.48	1.20	-.03	-.10	.04	.10	.02	.15*	.25***	.22***	.72		
10. Mobile application loyalty	.80	4.92	1.47	.15*	.05	.03	.40***	.40***	.25***	. 17**	.17**	.04	.73	
11. Continued intention to use	.77	4.90	1.50	-.04	-.15*	.07	.42***	.40***	.44***	.24***	.35***	.41***	.44***	.71

*p < 0.05, **p < 0.01, and ***p < 0.001

Appendix N

Study 2: Unique Proportion of Variance in the Second-Order Construct Explained by Each First-Order Construct

Second-Order Construct	First-Order Construct	R^2	Fornell and Larcker's Construct Reliability Index
Application design	Branding	.07	.87
	Data preservation	.08	.89
	Instant start	.05	.83
	Orientation	.05	.84
Application utility	Collaboration	.05	.86
	Content relevance	.35	.86
	Search	.04	.82
User interface graphics	Aesthetic graphics	.11	.85
	Realism	.11	.84
	Subtle animation	.16	.82
User interface input	Control obviousness	.02	.81
	De-emphasis of user settings	.05	.87
	Effort minimization	.12	.85
	Fingertip-size control	.06	.84
User interface output	Concise Language	.04	.80
	Standardized user interface element	.05	.83
	User-centric terminology	.06	.79
User interface structure	Logical path	.08	.78
	Top-to-bottom structure	.15	.82

Appendix O

Study 2: Item Loadings and Weights

Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order	Construct Name	Error	Loadings	Weights on 2nd Order
First-Order Constructs											
Branding (BRAN1-4)	0.77	0.85	0.35***	Aesthetic graphics (AEST1-4)	0.69	0.85	0.41***	Concise language (CLAN1-4)	1.02	0.80	0.25***
	0.75	0.87			0.75	0.84			1.04	0.85	
	0.82	0.82			1.02	0.79			1.04	0.75	
	0.80	0.91			1.04	0.91			0.85	0.76	
Data preservation (DAPR1-4)	1.04	0.87	0.29***	Realism (REAL1-4)	0.74	0.83	0.33***	Standardized user-interface element (SUI1-4)	0.87	0.82	0.34***
	0.89	0.87			0.79	0.88			0.87	0.79	
	0.90	0.92			0.80	0.85			1.02	0.83	
	1.02	0.89			0.85	0.79			0.94	0.85	
Instant start (STAR1-4)	1.02	0.80	0.24***	Subtle animation (SANM1-4)	1.02	0.69	0.42***	User-centric terminology (UCT1-4)	1.04	0.71	0.26***
	1.04	0.80			0.86	0.89			0.89	0.84	
	1.02	0.83			0.80	0.83			0.80	0.80	
	0.82	0.86			0.85	0.84			0.82	0.79	
Orientation (ORIE1-4)	1.04	0.90	0.35***	Control obviousness (COOB1-4)	1.02	0.74	0.28***	Logical path (LP1-4)	0.88	0.75	0.35***
	1.02	0.89			1.00	0.83			0.89	0.75	
	0.91	0.80			1.04	0.80			1.02	0.82	
	0.93	0.76			1.03	0.84			0.90	0.75	
Collaboration (COLL1-4)	0.77	0.80	0.32***	De-emphasis of user settings (DUS1-4)	1.05	0.85	0.32***	Top-to-bottom structure (TTPS1-6)	1.04	0.82	0.37***
	0.77	0.89			0.82	0.87			1.02	0.88	
	0.85	0.88			1.02	0.85			1.01	0.70	
	0.88	0.85			0.77	0.89			0.85	0.82	
Content relevance (CRLV1-4)	1.02	0.88	0.60***	Effort minimization (EMM1-4)	1.04	0.85	0.35***		0.97	0.80	
	0.85	0.88			0.85	0.85			0.95	0.84	
	0.85	0.82			0.89	0.83					
	0.98	0.83			1.04	0.84					
Search (SEAR1-4)	1.04	0.81	0.30***	Fingertip-size controls (FTSC1-4)	0.84	0.90	0.32***				
	0.83	0.84			0.90	0.87					
	0.91	0.79			0.95	0.79					
	0.78	0.80			0.97	0.77					
Second-Order Constructs											
Application design (DES1-4)	1.04	0.83	NA	User interface graphics (INTG1-4)	1.04	0.80	NA	User interface output (CONT1-4)	0.90	0.80	NA
	1.00	0.83			1.00	0.81			0.82	0.74	
	0.84	0.90			0.84	0.82			1.00	0.77	
	0.84	0.80			0.95	0.82			0.85	0.77	
Application utility (PURP1-4)	0.88	0.80	NA	User interface input (INP1-4)	1.04	0.80	NA	User interface structure (STRU1-4)	0.78	0.78	NA
	0.84	0.75			1.04	0.75			1.00	0.80	
	0.92	0.78			0.90	0.82			1.00	0.77	
	1.04	0.80			0.86	0.76			1.04	0.82	

*p < 0.05, **p < 0.01, and ***p < 0.001