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Role of Perceived Response Time in Influencing the Relationship between Perceived Visual Appeal and Satisfaction Associated with Self-Service Business Intelligence Systems

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Organizations invest vast amounts of resources to equip their employees with leading edge Business Intelligence (BI) systems to power smart decisions. With significant digital upskilling in the last decade, most of the business intelligence systems are consumed in the self-service mode (e.g. Power BI, Tableau etc). It is of paramount importance to enhance the chances of success of these resource hungry self-service BI systems, to ensure the organizations can generate the desired payback from their investments. If the systems are not utilized as desired, it also impedes the quality of decisions made by the managers in these organizations, directly impacting the competitiveness of the organization. Perceived Visual Appeal is a critical component of system's quality that influences Satisfaction associated with self-service BI systems. High user interface quality, powered by its Visual Appeal is core to the reduction of cognitive load and enable easier evaluation of decision alternatives. From the literature on web customer Satisfaction, we learn that users make inferences about the attractiveness of a system from its design elements like Visual Appeal, ease of navigation, speed of content retrieval etc. UI designers many times face the dilemma of balancing Visual Appeal and Response Time, as the system can slow down when the designer augments more graphics, visual quality or uses custom visuals in tools like PowerBI. When we introduce 'Perceived Response Time' to gauge the user's perception of the speed of content retrieval, alongside Perceived Visual Appeal into the model for measuring the satisfaction associated with self-service BI systems, we unearth interesting insights on how 'Perceived Response Time' significantly influences the relationship between 'perceived Visual Appeal' and 'Satisfaction' associated with self-service BI systems. We undertake a unique experiment-based approach to study how 'Perceived Response Time' mutes the relationship between Perceived Visual Appeal and Satisfaction, thereby providing value insights to the BI practitioners across industries. The learnings are significant as they can be extended to other information systems beyond self-service BI systems, contributing to the IS literature. This would inspire future research into the relative influence of system quality measures on Satisfaction.

Keywords: Satisfaction, Self-Service, Business Intelligence, System quality, Visual Appeal, Response Time, Interface quality

Introduction:

Gartner forecasts the worldwide IT spends in 2023 at 4.7 trillion USD, growing at the rate of 4.3%. The fact that there are just 2 countries, USA and China, whose annual GDPs are bigger than the worldwide IT spends, can give us a gauge of the magnitude of the IT spends. A big chunk of these spends goes towards powering impactful business decisions to stay ahead of the competition and this involves investments in data lakes, ERP systems, decision support systems powered by self-service business intelligence tools like Tableau, PowerBI, ThoughtSpot etc. Considering the scale of the investments going into the business intelligence space, it is important to maximize the chances of success of these self-service Business Intelligence (BI) systems to enable organizations to unlock the targeted returns.

Self-service BI space is different from traditional BI where there used to be a request-response relationship between the business users and the technical team enabling the systems. In the self-service BI space, business intelligence is built on top of the data foundations and accessible, across the various levels in the organization. Business users are expected to access the systems, understand the data, unlock insights, and make the required decisions to run the organization. This is where the

challenge lies – recent studies have shown that business users are not using more than 20% of the BI tools efficiently and proactively to accomplish their tasks.

System Quality plays a decisive role in influencing the satisfaction associated with the BI systems (DeLone & McLean, 2003). Post-consumption eexpectations are a prominent driver of Perceived Usefulness and Satisfaction ((Bhattacherjee, Understanding information systems continuance: An expectation-confirmation model, 2001a). Technology Acceptance model has always highlighted that the ease of use of a system is core to its success and the efforts required to use a system should not outweigh the benefits. Researchers (Islam A. , 2012) have extended Expectation Confirmation theory (ECT) based continuance models to break down 'perceived system quality' into sub-constructs to understand their influence on satisfaction. From an in-depth study of literature, we can clearly establish that 'Perceived Visual Appeal' and 'Perceived Response Time' are components of system quality that can influence satisfaction as well as the perceived net benefits associated with self-service BI systems. In the IS literature, there is no clear understanding of the relative influence of 'Perceived Response Time' and 'Perceived Visual Appeal' in influencing satisfaction and Net Benefits. This is exactly where our study fits in. We develop the theory based on the rich literature to understand the potential drivers of Satisfaction and Perceived Net Benefits but focus on narrowing down to two prominent system quality sub-constructs – Perceived Response Time and Perceived Visual Appeal. We adopt a one of its kind experimentation-based methodology to construct artifacts that have the same visual appeal but differ in response time and make our participants experience the artifacts and then, respond to a survey to capture their perceptions, immediately after their experiences with the artifacts.

We collected data from ~176 participants in our experiment and built 2 structural models using SmartPLS to study the results from the experiment. The findings provide strong evidence to establish that perceived visual appeal is a more significant driver of satisfaction in comparison to perceived response time when the response time is fast. When the response time gets slower, the impact of perceived visual appeal gets suppressed or made insignificant. This provides actionable insights to HCI designers and practitioners that both perceived visual appeal and perceived response time need to be jointly superior for visual appeal to influence satisfaction. We further understand that when the Response Time is fast, Perceived Response Time is a more significant influencer of Perceived Net Benefits in comparison to "Perceived Visual Appeal". Under a condition, where the Response time is poor, Perceived response time loses all its impact on Perceived Net Benefits and Perceived Visual Appeal has a relatively higher influence on Perceived Net Benefits. We conclude that in totality, "Perceived Visual Appeal" is relatively a more important influencer of Satisfaction and Perceived Net Benefits in comparison to "Perceived Response Time" for self-service BI systems. This is also driven by the fact that there is a significant relationship between Perceived Visual Appeal and Perceived Response Time, where Visual appeal influences how response time is perceived.

We contribute to IS literature providing a first of its kind experimentation-based methodology to study the relative influence of system quality sub-constructs in the context of self-service BI systems. The outcomes provide actionable guidance to HCI designers while making tradeoffs between visual appeal and response time, especially when they are considering more graphical components to amplify visual appeal that can compromise response time/loading time of the graphics. In future, there are opportunities to further study the variances of these relationships by age, gender, education background, work experience etc. There are also possibilities to study geographical & cultural variations in the strength of the relationships, expanding the learnings from self-service BI systems to IT systems in general.

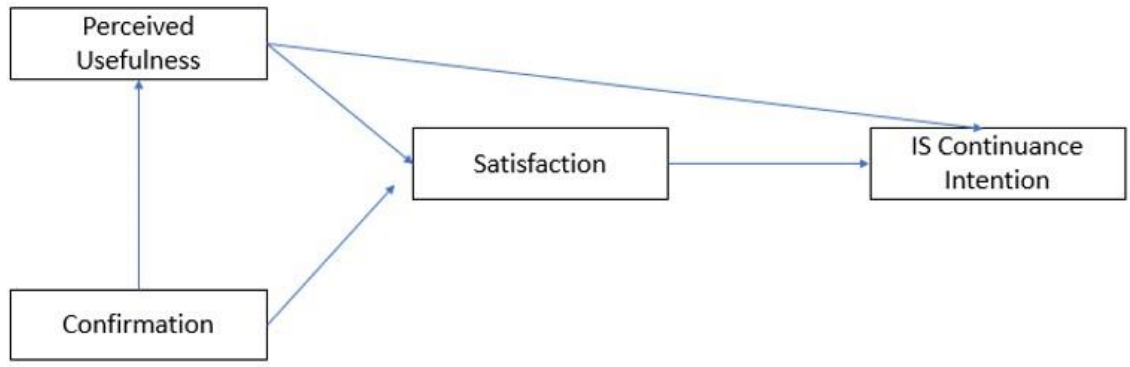
Overview of Literature:

One of the best places to start exploring IS literature to understand the drivers of Satisfaction is by reviewing the Expectation Confirmation Model (ECM) that describes Continuance Intention and Satisfaction of users of Information systems. ECM (Bhattacharjee, 2001) is an adaptation of Expectation Confirmation Theory and postulates

that post-consumption expectations are a key driver of Perceived Usefulness and Satisfaction. Satisfaction & Perceived Usefulness influence the continued use of Information Systems.

Figure 1

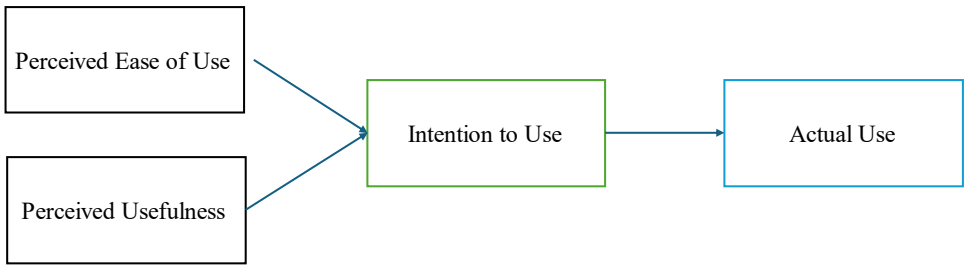
Expectation Confirmation Model : Bhattacharjee(2001)



From Technology Acceptance Model (Davis, Bagozzi, & Warshaw (1989))), we learn that a system will be used only if it is perceived as easy to use, even though it may be useful, highlighting that the efforts to use a system should not outweigh the benefits of using the system. Perceived Ease of Use refers to the features of a system, that includes the ease with which a user can learn, adapt, and use an Information system. Visual Appeal, that manifests in the form of clarity of interface has clear support in TAM & influences our hypothesis, when we attempt to collapse system quality dimensions.

Figure 2

Technology Acceptance Model – TAM : Davis(1989), Davis, Bagozzi & Warshaw(1989)

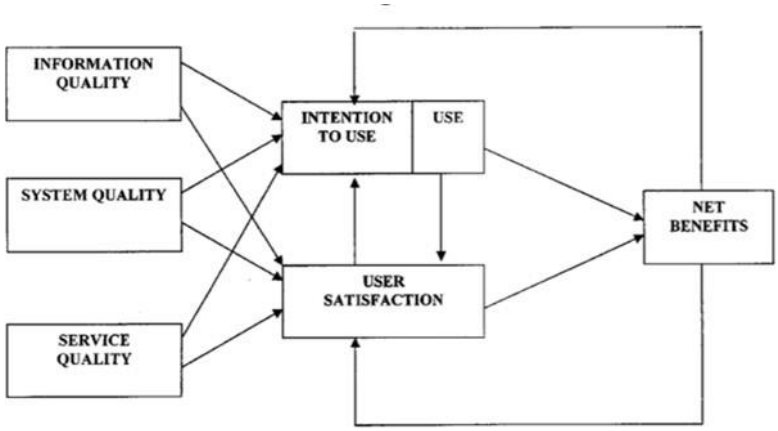


DeLone & McLean (1992) revolutionized the IS success model which established a clear relationship between System Quality and Satisfaction. They introduced the 'Net Benefits'

construct in the evolution of D&M IS success model in 2003 by collapsing individual impact and organizational impact, which can serve as a better target construct for an experiment.

Figure 3

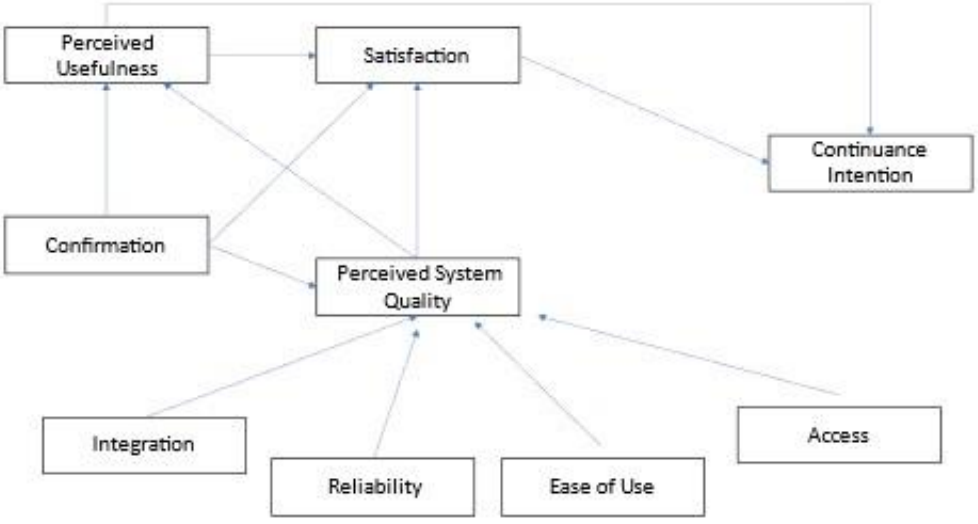
DeLone and McLean IS Success Model (2003)



Najmul Islam (Islam A. , 2012) extended the ECT based IS continuance model (above) by including 'Perceived System Quality' in the context of e-learning systems. He used sub-constructs of system quality like access, integration etc. that were relevant in the context of e-learnings systems. Seeking inspiration from this, we proceed to decompose System Quality in the context of self-service BI system and specifically focus on two specific sub-constructs namely, 'Perceived Visual Appeal 'and 'Perceived Response Time'.

Figure 4

Extending ECM based IS success model: Islam(2012)



We seek support from the below IS literature to establish Visual Appeal as a core sub-construct of System quality.

Literature Summary - Role of Visual Appeal in Satisfaction

Highlights	**Impacted Construct**	**Referances**
Fun or Enjoyment (aspect of user experience)	*Satisfaction*	Cockton, Hvannberg, & Law (2008)
Visually Engaging Experience	*Satisfaction*	Chou & Conley (2009)
Shape, translucency, Heaviness, Neatness, Elegance, and attractiveness	*Image/Impression dimensions*	Eraslan (2009)
Characteristics of the designed system (e.g., **simplicity, usability, appeal**, functionality etc)	*User Experience*	Hassenzahl & Tractinsky (2006)
Create outstanding **quality experiences** rather than merely preventing usability problems	*Satisfaction (Positive Psychology in HCI)*	Seligman & Csikszentmihalyi (2000)
Extent to which a system supports and **enriches the ongoing experience** of people who use that system	*Usability*	Whiteside & Wixon (1987)
Participants highly valued a website that was found to be **visually extremely appealing** though they could not complete even one half of the tasks successfully	*Impact of Visual Appeal vs Usability*	Lingaard & Dudek (2002)
Visual appeal factors may be detected first and these influences how users judge subsequent experience with the site	*Influence of Visual Appeal*	Jennings (2000)
Carry **first impression to the evaluation of other attributes** of products	*'Halo Effect'*	Rosenzweig (2014)
In the presence of very **positive first impression, a user may disregard possible negative issues** experienced later	*Role of 'first impression'*	Campbell & Pisterman (1996)

We further build on this with the WEBQUAL literature (Loiacono, Watson, & Goodhue, 2007) that establishes Visual Appeal and Response Time as two of the twelve core dimensions to measure website quality, which has strong similarities with how self-service BI systems operate.

When we review the literature on IS Satisfaction, we find support in the early work compiled by Bailey & Pearson (1983), where 'format of output' and 'response time' are distinct factors. Doll & Torkzadeh (1988) further highlight format and timeliness as part of their 40-point instrument to measure end user perceptions on satisfaction.

When we compare pre-use expectations and post-use perceptions, we obtain unfulfilled expectations which is a core predictor of Satisfaction (Oliver, 1989). Based on the disconfirmed expectation theory, consumers will be satisfied if performance met or exceeded expectations while dissatisfaction is the result of performance not meeting expectations (Oliver and DeSarbo, 1988).

Hence, we plan to use desired expectations, rather than predictive expectations where desired expectations stand for the level of system performance the user wants (Suh, Kim & Lee,1994). This will help us to remove logical inconsistencies observed in the disconfirmation of expectations model.

Theory Development:

Basis the work done by Islam (2012), using ECM based IS success model we can establish a clear relationship between 'Confirmation' of expectations and Perceived System Quality. There are two aspects that need to be noted.

a) We opt for desire confirmation in place of expectation confirmation building on the work

done by Suh, Kim & Lee (1994), leveraging the disconfirmation of expectations model.

b) We replace system quality with focused sub-constructs of system quality that are relevant for self-service BI system, namely Perceived Visual Appeal and Perceived Response Time.

This enables us to propose hypothesis 1 and 2.

H1: 'Desire Confirmation' of self-service BI system is positively associated with their 'Perceived Response Time' of the system.

H2: 'Desire Confirmation' of self-service BI system is positively associated with 'Perceived Visual Appeal' of the system.

Expectation Confirmation Model (Bhattacherjee, 2001) proposed a causal relationship between 'Confirmation' and 'Perceived Usefulness' of Information Systems and this relationship is a prominent relationship validated by several IS studies. The level of desire confirmation is also expected to positively affect 'Perceived Ease of Use'. This suggests that as users gain desire confirmation experience, their 'perceived ease of use' would be updated and become more concrete which is supported by extensions of Expectation confirmation Model (Thong, Hong & Tam, 2006). Using this, we arrive at the hypothesis below:

H3: 'Desire Confirmation' of self-service BI system is positively associated with 'Perceived Ease of Use' of the system.

H4: 'Desire Confirmation' of self-service BI system is positively associated with 'Perceived Usefulness' of the system.

Since Islam (2012) also establishes clear relationships between confirmation and satisfaction and our plan is to use 'Net Benefits' as a surrogate for continued use, building on Delone & McLean's (2003) work, we obtain the below hypothesis.

H5: 'Desire Confirmation' of self-service BI system is positively associated with their 'Satisfaction' with Use.

In the same way, 'Desire confirmation' would also influence 'Perceived Net Benefits' which leads us to the hypothesis.

H6: 'Desire Confirmation' of self-service BI system is positively associated with the 'Perceived Net Benefits' that accrue from System Use

Islam (2012) has established clear relationships between Perceived System Quality and Perceived Usefulness. We extend this relationship to the other TAM construct Perceived Ease of Use. Since we have decomposed Perceived System Quality into focused sub-constructs like Perceived Visual Appeal and Perceived Response Time, we obtain the below hypothesis.

H7: 'Perceived Response Time' of self-service BI system is positively associated with the 'Perceived Ease of Use' of the system.

H8: 'Perceived Response Time' of self-service BI system is positively associated with the 'Perceived Usefulness' of the system.

H9: 'Perceived Visual Appeal' of self-service BI system is positively associated with the 'Perceived Ease of Use' of the system.

H10: 'Perceived Visual Appeal' of self-service BI system is positively associated with the 'Perceived Usefulness' of the system.

Leveraging learnings from the WEBQUAL literature that establishes the role of response time and Visual appeal in influencing satisfaction and building on the learnings from Delone & McLean IS Success model, where Perceived Net Benefits measures the total impact on the individual and organization, we arrive at the below hypothesis.

H11: 'Perceived Response Time' of self-service BI system is positively associated with the 'Satisfaction' with Use.

H12: 'Perceived Response Time' of self-service BI system is positively associated with the Net Benefits' that accrue from System Use.

H13: 'Perceived Visual Appeal' of self-service BI system is positively associated with the 'Satisfaction' with Use.

H14: 'Perceived Visual Appeal' of self-service BI system is positively associated with the 'Perceived Net Benefits' that accrue from System Use.

It is quite key to understand if there are relationships that exist between the focus sub-constructs of system quality, namely Perceived Response Time and Perceived Visual Appeal. This area has not received attention in IS literature and hence we propose the below hypothesis.

H15: 'Perceived Visual Appeal' of self-service BI system is positively associated with the 'Perceived Response Time' of the system.

TAM has already established that Perceived Ease of Use influences Perceived Usefulness. The decomposed Expectation Confirmation Model of IT

Continuance (Islam, Mantymaki & Bhattacherjee, 2017) has suggested two dimensions of 'Usefulness' and 'Usability' influencing expectation confirmation. Since 'Usability' is already factored in by the design aspects like visual appeal, it is key to explore an alternate to 'Perceived Usability'. In HCI literature, 'Usability' or 'perceived Usability' is a core construct while MIS literature leverages 'perceived usefulness' and 'perceived ease of use' to understand the antecedents to Satisfaction & continued use of information systems. Hence, we propose the hypothesis below.

H16: 'Perceived Ease of Use' of self-service BI system is positively associated with the 'Perceived Usefulness' of the system.

H17: 'Perceived Ease of Use' of self-service BI system is positively associated with their 'Satisfaction' with Use.

H18: Perceived Ease of Use' of self-service BI system is positively associated with the 'Net Benefits' that accrue from System Use

TAM(Davis,1989) established 'Perceived Usefulness' and 'Perceived Ease of Use' as salient beliefs influencing Information System acceptance. Expectation Confirmation Model (Bhattacherjee, 2001) built on this and established 'Perceived Usefulness' as a key influencer of 'Satisfaction' of IS Users. This leads us to the hypothesis below.

H19: 'Perceived Usefulness' of self-service BI system is positively associated with their 'Satisfaction' with Use.

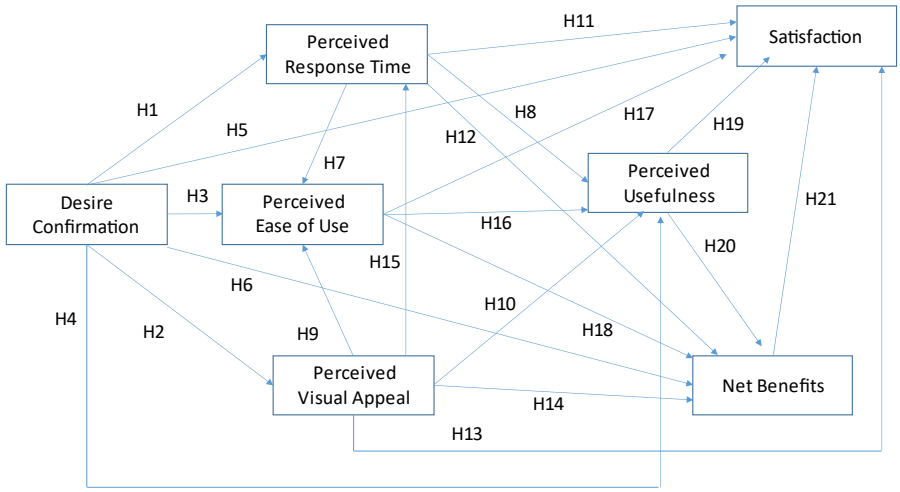
we intend to use one-off experimentation artifacts where the users are not expected to revisit post the experimentation due to which the construct 'IS Continuance Intention' has been replaced by 'Net Benefits' that would act as the proxy for benefits sought by the subject pool. Hence, it is important to posit a relationship between 'Perceived Usefulness' and 'Net Benefits'. This leads us to postulate the below hypothesis.

H20: 'Perceived Usefulness' of self-service BI system is positively associated with the 'Net Benefits' that accrue from System Use.

From the hypothesis, we create our research model to study the role played by 'Perceived Response Time' in influencing the relationship between 'Perceived Visual Appeal' and 'Satisfaction' with self-service BI systems.

Figure 5

Our research model



Methodology:

From the study of the rich literature on IT Continuance Intention (Nabavi. A et al, 2016), it is quite evident that survey is the most prominent source of data capture & structural equations modelling is the methodology that has been overwhelming deployed by the researchers to analyze data. Since we are dealing with perceptions here (like Perceived Visual Appeal, Perceived Response Time, Perceived Usefulness etc.), and

there are complex relationships that exist that bind attitudes (like satisfaction), behavioral intentions and the perceptions that drive these constructs, it is important to explore active experimentation-based methodologies to study these complex relationships. The core objective of our research is to understand the relative influence of 'Perceived Visual Appeal' and 'Perceived Response Time' in influencing 'Satisfaction' and 'Perceived Net Benefits' and hence, we dwell into the literature for examples of experimentation-based methodologies that can enable a better understanding of these relationships.

Doong & Lai (2008) used expectation-disconfirmation theory to investigate the factors influencing the user's Satisfaction and Usage Continuance of e-negotiation systems. An experimental approach was adopted where two web-based e-negotiation systems were used to collect data from 170 negotiators who participated in an e-negotiation experiment lasting for 17 days. Post this, subjects answered a questionnaire on e-negotiation systems. (Hayashi, Chen, Ryan, & Wu, 2004) studied the factors that influence the satisfaction level of online learners and their intention to continue using the e-learning system. The setting for the field experiment conducted by Hayashi et al (2004) was two accredited universities: California State University at Northridge and Loyola Marymount University. The experiment was motivated by the need of 110 college undergraduate Business majors to learn Microsoft Access. Participants filled out a questionnaire regarding their experiences of using Microsoft Access and other database applications. This survey was used to check the effects of computer literacy and experience the findings.

In a similar way, we intend to conduct an experimentation, followed by a survey to capture the data for our analysis. This can ensure that the perceptions from the participants are captured immediately after participation in the experiment, thereby ensuring a better quality of data, unlocking rarer methods to study these relationships in IS literature, in the context of self-service BI systems.

Study design:

We construct 2 artifacts, artifact A1 and artifact A2 using power BI that will have the same visual appeal, but different response times, but working on the same data set. This way, the artifacts are the same, except for the fact that they are calibrated for different response times.

- Artifact A1: Superior Visual Appeal, Faster Response Time
- Artifact A2: Superior Visual Appeal, Poorer Response Time.

While constructing the artifacts, care is ensured that sufficient care is taken to keep the poorer response times within the range that is advised in literature to keep the users engaged with the artifacts. When an inquiry is made through a terminal, the user's attention is focused on receiving a response. If the response delay exceeds 15 seconds, it can become an annoyance, disrupt work pace, and reduce motivation. Delays of 15 seconds or longer make conversational interaction between humans and information systems impractical (Miller, 1968). Hence the upper threshold for our artifact A2 that renders poorer response times is 15 secs (in the band of 11 secs to 15 secs). When the nature of inquiry made by humans with a computer is complex in nature, where the response would be a graph or a chart, supported by a table, the ideal response is expected to begin within two seconds and get completed within ten seconds (Miller, 1968). Tasks that require shorter attention spans, usually within 10 seconds, significantly influence people's perception of computer performance. These tasks are the ones people focus on the most and are widely agreed to have the most impact on the user experience (Seow, 2008). The faster artifact A1 is calibrated to operate at an average response time of ~6 secs (in the band of 2 secs to 10 secs).

While designing the artifacts A1 & A2, inputs such as aesthetics, balance, proportion, symmetry, colour contrasts, and fonts were paid specific attention to maximize the visual appeal (Zen & Vanderdonckt , 2016). Since we are interested in the audience who develop and design analytical products and use self-service BI tools on a regular basis, our target audience will be a mixture of B-school student and technology professionals working in industry and consuming self-service BI tools like Power BI. We have chosen IPL (Indian Premier League) as the data theme for our artifacts, as our study is getting conducted in India and we

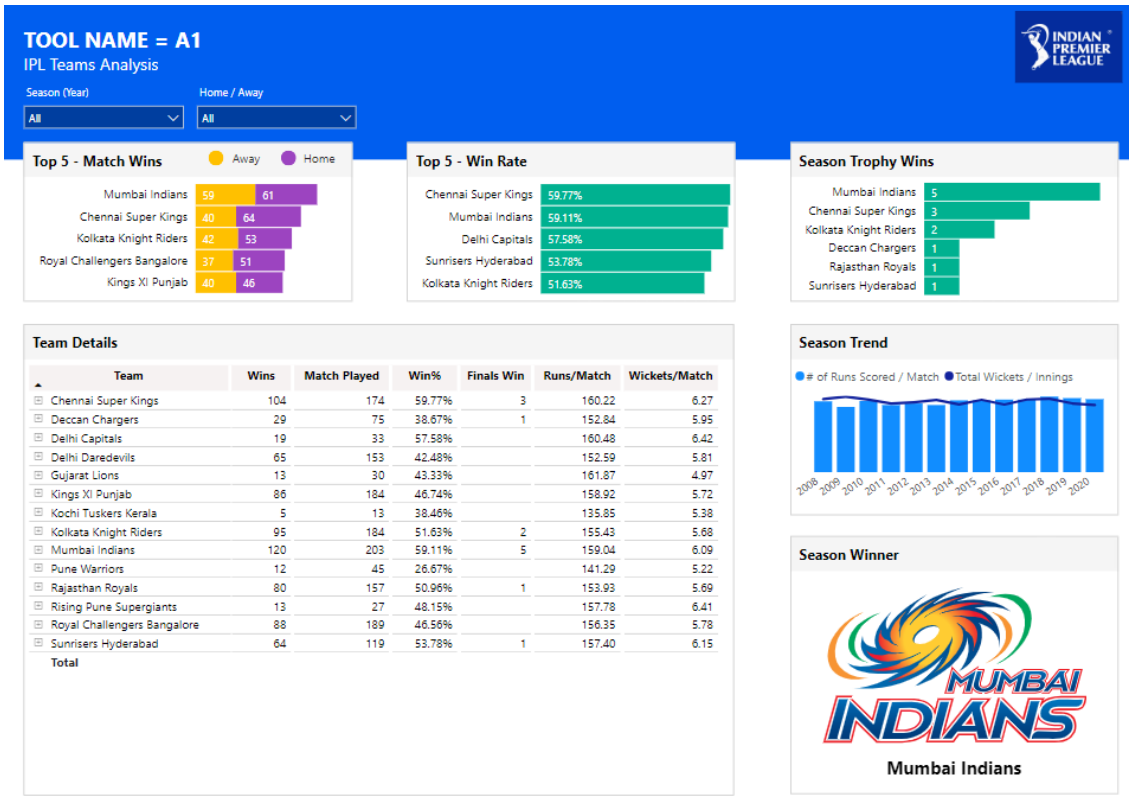
have wide understanding of IPL cricket across our target audience, balancing both males and females. As per BARC (Broadcast Audience Research Council) India viewership data, the tournament clocked a cumulative reach of 405 million viewers —out of a total TV universe of 836 million—across 21 channels that Star & Disney India aired the matches on (Laghate, 2020). This single event has more viewers than the total of 30+ OTT platforms viewership across India that was expected to have 355 million viewers in 2020 (Balakumar, 2020). On a global scale, IPL in India with 405 million viewers is bigger than the global viewership of UEFA Champions league (with 380 million viewers) despite soccer being the most popular sport in the world (Baker, 2020).

Steps followed:

1. We designed the artifacts A1 and A2, where A1 had superior visual appeal and faster response time. For A2, we had the same superior visual appeal but poorer response time.
2. Participants used the artifacts A1 and A2 to answer an IPL quiz that was administered on Kahoot. As the participants answer the quiz, they will keep getting feedback from Kahoot on whether the quiz answers are accurate or otherwise. This can help them form perceptions on net benefits, usefulness. Their experience of navigating through the multiple pages of the artifacts will help them form perceptions on visual appeal, response time, confirmation of desire, ease of use etc.
3. Participants answered a survey questionnaire as their final step that captured these perceptions and their levels of satisfaction.
4. A web-portal was created with clear instructions, a help video, the link to artifacts, quiz, and final survey, so that participants can navigate through a simple, step by step approach to participate in the experiment.

Artifact Output examples: A1

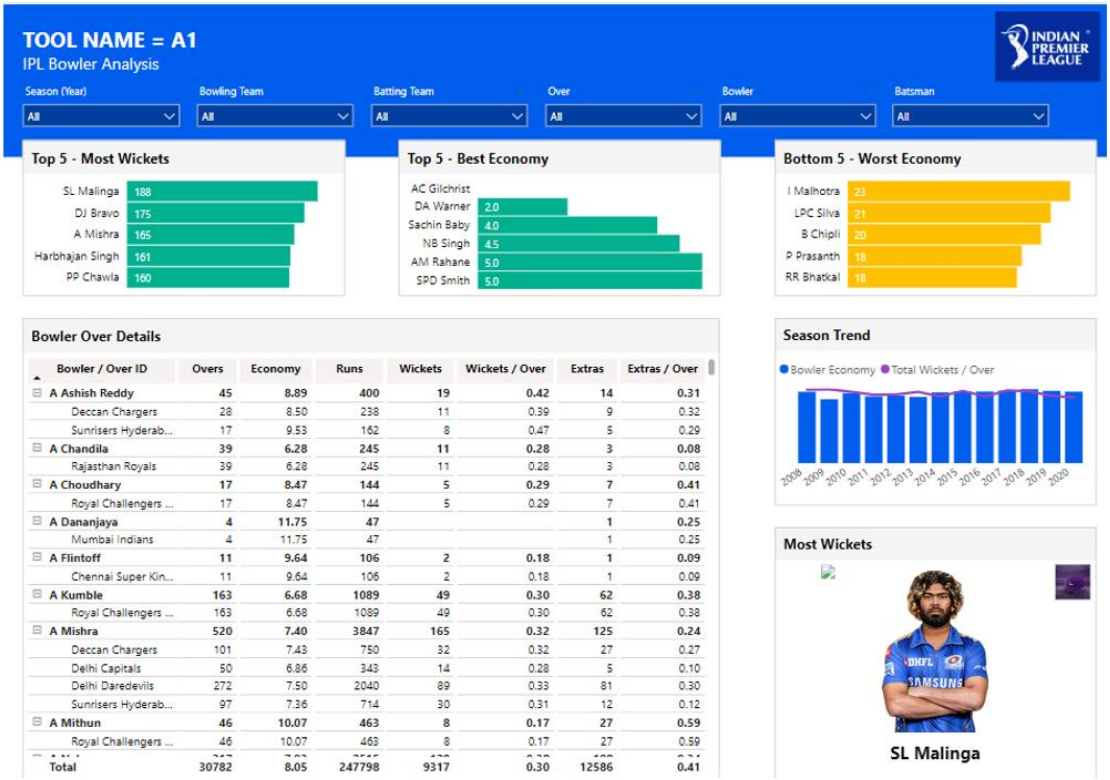
A1: Page 1



A1: Page 2

Batsmans / Match ID	Runs	# of 6s	# of 4s	Balls Faced	Runs / Balls	Innings	Runs / Innings
A Ashish Reddy	280	15	16	196	1.43	23	12.17
Deccan Chargers	35	1	3	30	1.17	5	7.00
Sunrisers Hyderab...	245	14	13	166	1.48	18	13.61
A Chandila	4			7	0.57	2	2.00
Rajasthan Royals	4			7	0.57	2	2.00
A Chopra	53		7	75	0.71	6	8.83
Kolkata Knight Rid...	53		7	75	0.71	6	8.83
A Choudhary	25	1	1	20	1.25	3	8.33
Royal Challengers ...	25	1	1	20	1.25	3	8.33
A Dananjaya	4			5	0.80	1	4.00
Mumbai Indians	4			5	0.80	1	4.00
A Flintoff	62	2	5	57	1.09	3	20.67
Chennai Super Kin...	62	2	5	57	1.09	3	20.67
A Kumble	35		3	49	0.71	15	2.33
Royal Challengers ...	35		3	49	0.71	15	2.33
A Mishra	362	5	29	410	0.88	54	6.70
Deccan Chargers	84	1	10	73	1.15	14	6.00
Delhi Capitals	21		2	26	0.81	4	5.25
Delhi Daredevils	164	4	8	201	0.82	28	5.86
Sunrisers Hyderab...	93		9	110	0.85	8	11.63
Total	235212	8690	21478	189888	1.24	1586	148.31

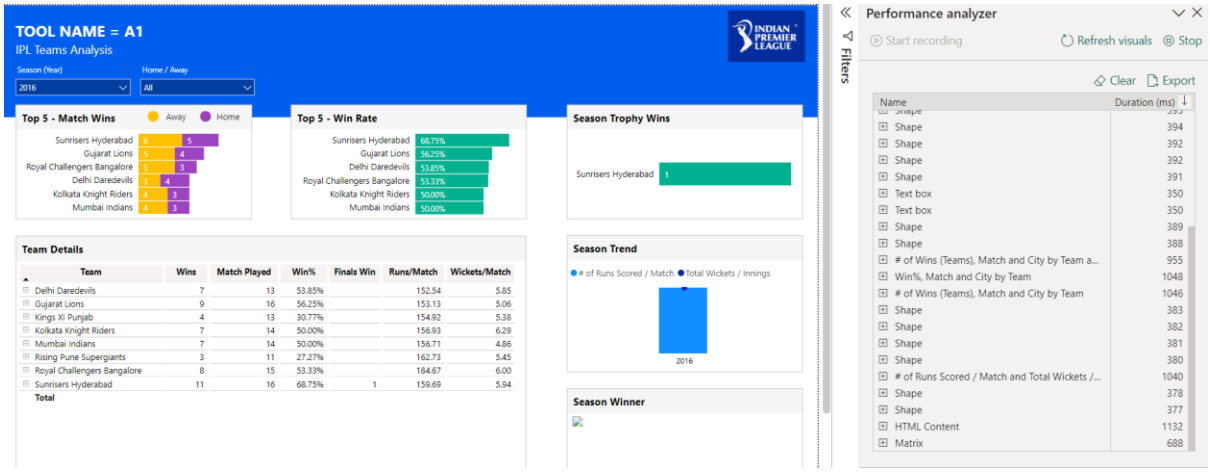
A1: Page 3



Bowler / Over ID	Overs	Economy	Runs	Wickets	Wickets / Over	Extras	Extras / Over
A Ashish Reddy	45	8.89	400	19	0.42	14	0.31
Deccan Chargers	28	8.50	238	11	0.39	9	0.32
Sunrisers Hyderab...	17	9.53	162	8	0.47	5	0.29
A Chandila	39	6.28	245	11	0.28	3	0.08
Rajasthan Royals	39	6.28	245	11	0.28	3	0.08
A Choudhary	17	8.47	144	5	0.29	7	0.41
Royal Challengers ...	17	8.47	144	5	0.29	7	0.41
A Dananjaya	4	11.75	47			1	0.25
Mumbai Indians	4	11.75	47			1	0.25
A Flintoff	11	9.64	106	2	0.18	1	0.09
Chennai Super Kin...	11	9.64	106	2	0.18	1	0.09
A Kumble	163	6.68	1089	49	0.30	62	0.38
Royal Challengers ...	163	6.68	1089	49	0.30	62	0.38
A Mishra	520	7.40	3847	165	0.32	125	0.24
Deccan Chargers	101	7.43	750	32	0.32	27	0.27
Delhi Capitals	50	6.86	343	14	0.28	5	0.10
Delhi Daredevils	272	7.50	2040	89	0.33	81	0.30
Sunrisers Hyderab...	97	7.36	714	30	0.31	12	0.12
A Mithun	46	10.07	463	8	0.17	27	0.59
Royal Challengers ...	46	10.07	463	8	0.17	27	0.59
Total	30782	8.05	247798	9317	0.30	12586	0.41

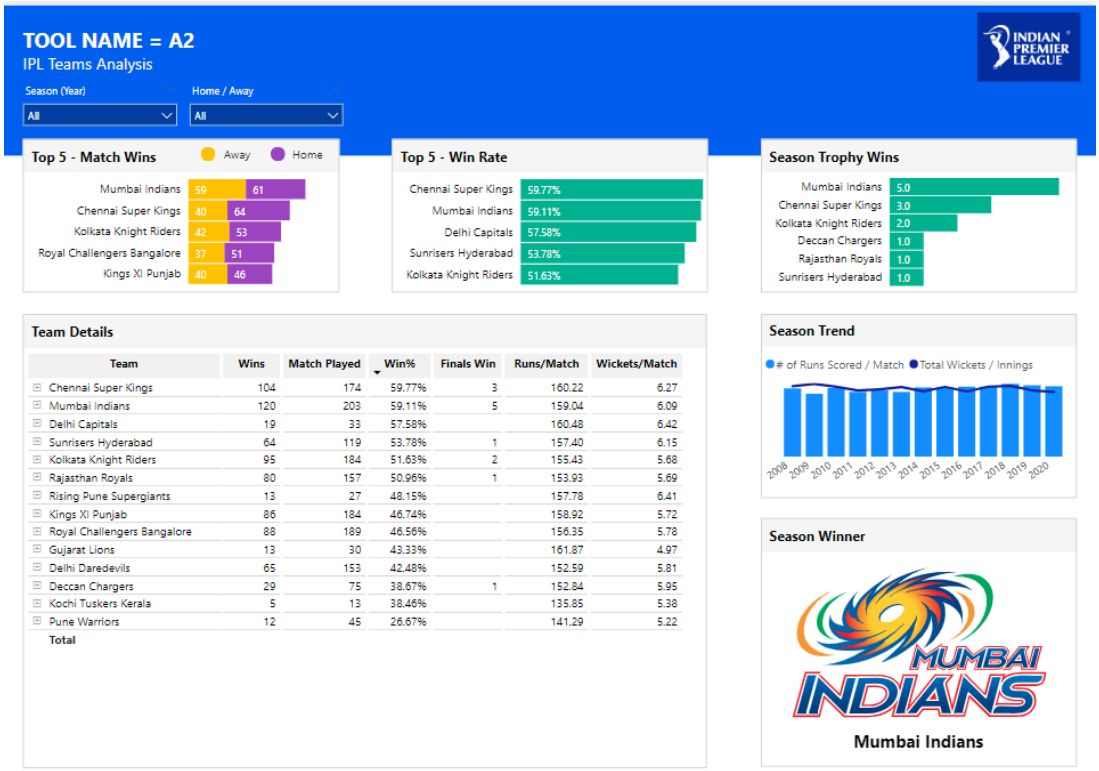
A1: Faster Response Time

Performance statistics highlight that average response time < 8 seconds.

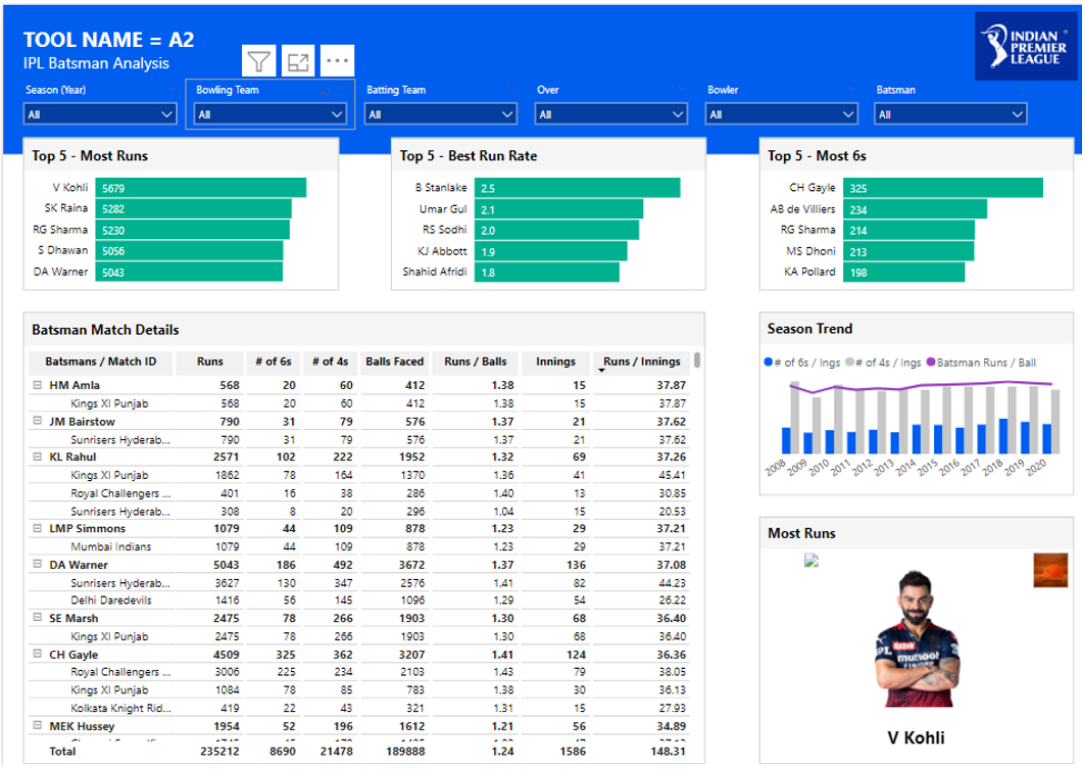


Artifact Output examples: A2

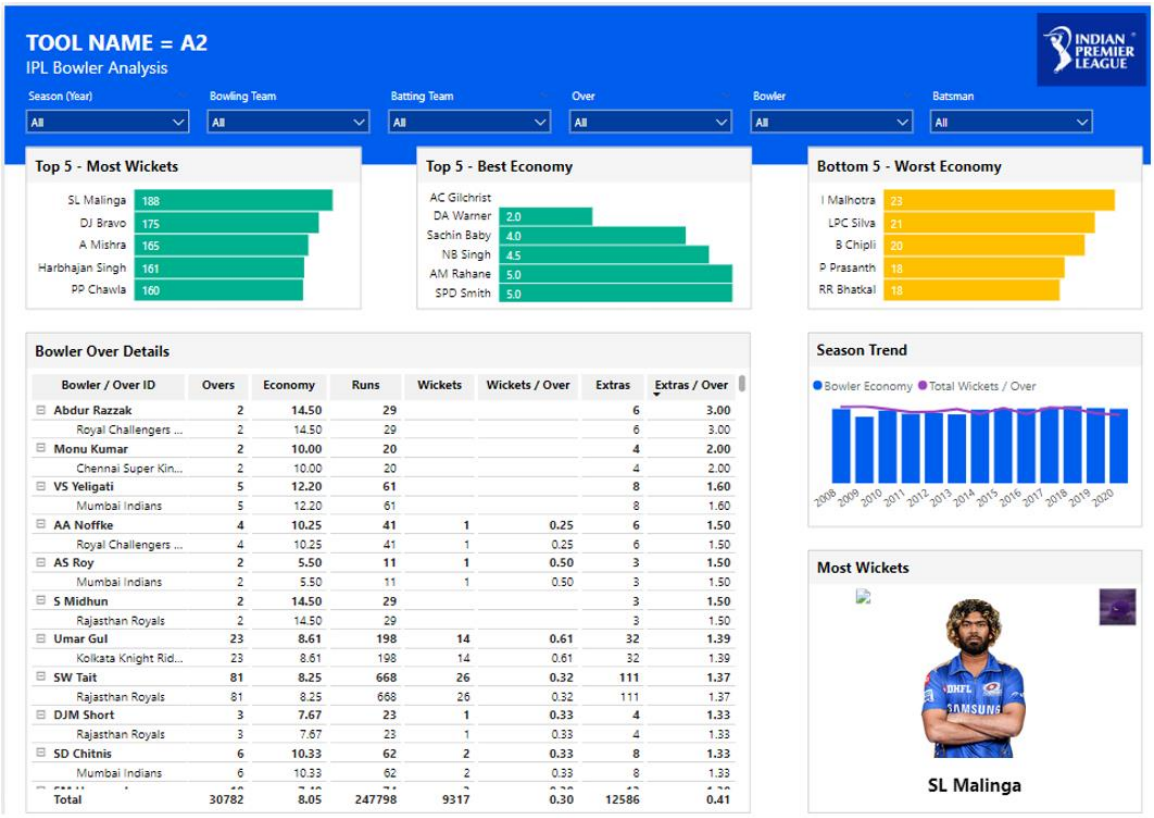
A2: Page 1



A2: Page 2

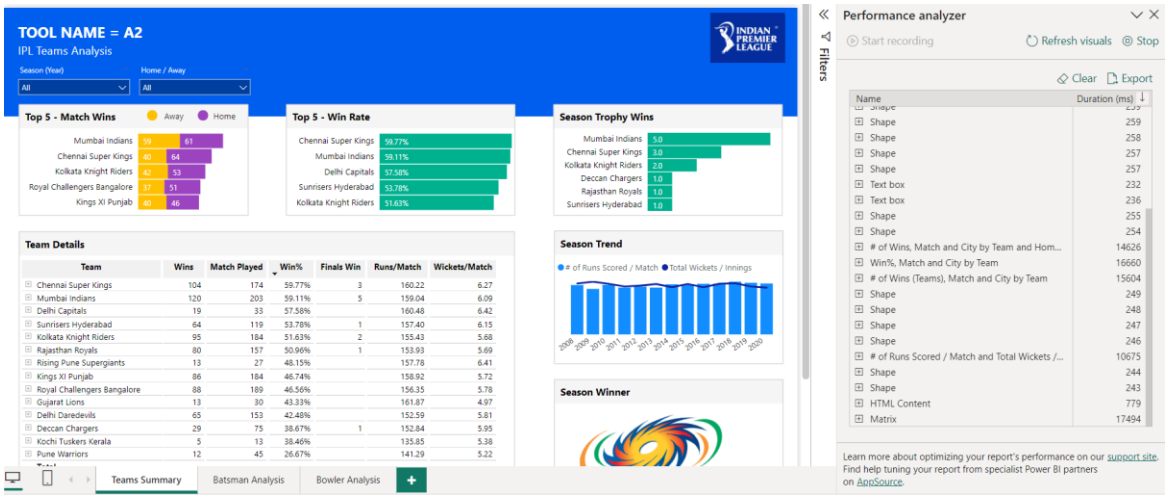


A2: Page 3



A2: Poorer Response Time

Performance statistics highlight that average response time is ~ 15 seconds.



Instrument Design:

We leverage the rich IS literature to model the questionnaire, and we construct survey questions for measures on Perceived Usefulness, Perceived Ease of Use, Satisfaction, desire confirmation, Perceived Response Time, and Perceived Visual Appeal. We use self-developed measures only for Perceived Net Benefits alongside what is already available in the literature. The questions used in the survey along with the appropriate literature inspirations are available below.

Initially, 2 experts reviewed the instrument to evaluate it for face and content validity. Post incorporation of relevant feedback, a pilot study with ~10 participants was conducted using convenience sampling.

Final Instrument for all measures:

Construct	Items	Statements	Adopted from
Perceived Usefulness	PUSE1	I am able to accomplish my objectives quickly	Davis (1989), Pituch & Lee (2006), Limayem et al (2007), Islam (2011), Islam (2012), Li et al (2012), Venkatesh & Davis (1996), Ngai et al (2007), Islam & Mantymaki (2011), G. Wei-Han Tan et al. (2014), Mohammadi (2015)
	PUSE2	I evaluate the system as useful	
	PUSE3	Using the system can be of benefit to me	
	PUSE4	The advantages of the system outweigh its disadvantages	
Perceived Ease of Use	PEOU1	I find it easy to get the tool to do what I want to do	Davis (1989), Pituch & Lee (2006), Islam (2011), Islam (2012), Li et al (2012), Venkatesh & Davis (1996), Ngai et al (2007), Venkatesh & Davis (2000), Lee, Yoon & Lee (2009), Idemudia & Jones (2015), G. Wei-Han Tan et al (2014), Barnes & Vidgen (2000), Davis et al (1989), Davis (1989,1993), Nielson (1993,1999,2000)
	PEOU2	My interaction with the tool is clear and understandable	
	PEOU3	It would be easy for me to become skilful at using the tool.	
	PEOU4	I find the tool easy to use.	
SATISFACTION	SATF1	My overall experience of using the tool is very satisfied.	Bhattacherjee (2001), Islam (2011), Islam & Mantymaki (2011), Islam (2012)
	SATF2	My overall experience of using the tool is very pleased.	
	SATF3	My overall experience of using the tool is absolutely delighted.	

Construct	Items	Statements	Adopted from
DESIRE CONFIRMATION	DCON1	My experience with using the tool was better than what I desired.	Limayem et al, 2007, Islam & Mantymaki (2011), Islam (2011), Islam (2012), Chin & Lee (2000)
	DCON2	The Visual Appeal provided by the tool was better than what I desired.	
	DCON3	The Speed of Operation provided by the tool was better than what I desired.	
	DCON4	The 'Ease of Use' of the tool was better than what I desired.	
	DCON5	All things considered; the benefit provided by the tool was better than what I expected	
PERCEIVED RESPONSE TIME	REST1	When I use the tool, there is very little waiting time between my actions and the tool's response.	Pituch & Lee (2006), Bailey & Pearson (1983), Li et al. (2012), Chiew & Salim (2003), Loiacono, Watson & Goodhue (2002), S. Rose et al. (2012)
	REST2	When I am using the tool, the response is fast	
	REST3	In general, the response time of the tool is consistent	
	REST4	In general, the response time of the tool is reasonable	
PERCEIVED VISUAL APPEAL	VISA1	The tool is visually appealing	Loiacono, Watson & Goodhue (2002), Chiew & Salim (2003), Tarigan (2008), Ashrafi et al. (2020), Bailey and Pearson (1983), Chau et al (2000), DeLone and McLean (1992)
	VISA2	The tool presents the information in an appropriate format	
	VISA3	This tool has a consistent feel and look.	
	VISA4	The design of the tool makes sense, and it is easy to learn how to use it	
	VISA5	The colours in the tool are pleasant.	
NET BENEFITS	NETB1	Using the tool has helped me to solve for the questions accurately.	DeLone & McLean (2003), Yu & Qian (2018), Al-Mamary et al (2015), Al-Mamary (2019), Wang & Liao (2008), Self-developed
	NETB2	Using the tool has helped me to solve for the questions efficiently.	
	NETB3	The tool makes my task of solving for the questions easier.	
	NETB4	The tool is designed to save me time.	

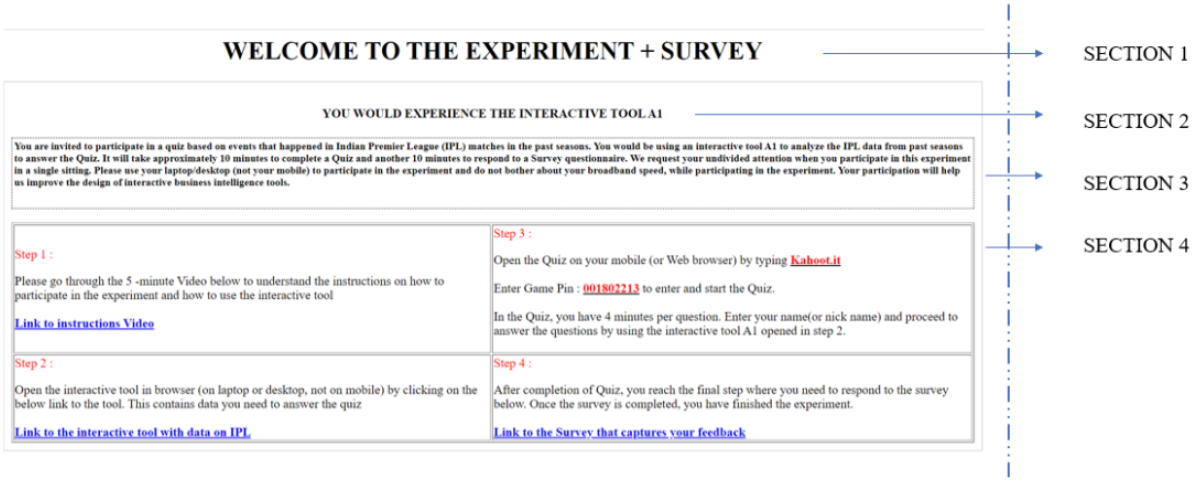
After constructing the artifacts A1 & A2, armed with our questionnaire, we conducted a pilot study with 12 participants by administering the experiment using a web-portal that has appropriate instructions to participate. Based on the findings from the pilot study, we concluded on the need to further augment instructions in the portal that can ensure the participants use laptop or desktop to participate in the experiment and not mobile. We concluded that the pilot study was successful.

Administering the experiment:

We created a website to enable the administration of the experiment to our target groups of participants. The website packaged all the perquisites required to administer the experiment to the participants & enable data collection from

the experiment (in the form of a survey that is administered immediately after participating in the experiment).

The website has a single page, and its contents include 4 SECTIONS.



- SECTION 1: This contained the title, and it welcomed the participants to the experiment + Survey.

- SECTION 2: This section called out the name of the interactive artifact that has been randomly assigned to a particular participant. For example, if a participant is assigned the artifact A1 (Good Visual Appeal, Faster Response Time), then this section calls out "You would experience the interactive tool A1", to the assigned participant.

- SECTION 3: This section specifies the context, instructions and the specific activities that are required to be carried out by the participant, as part of the experiment. If a participant is assigned the artifact A1 (Good Visual Appeal, Faster Response Time), then this section will read as below:

  "You are invited to participate in a quiz based on events that happened in Indian Premier League (IPL) matches in the past seasons. You would be using an interactive tool A1 to analyze the IPL data from past seasons to answer the Quiz. It will take approximately 10 minutes to complete a Quiz and another 10 minutes to respond to a Survey questionnaire. We request your undivided attention when you participate in this experiment in a single sitting. Please use your laptop/desktop (not your mobile) to participate in the experiment and do not bother about your broadband speed, while participating in the experiment. Your participation will help us improve the design of interactive business intelligence tools."

- SECTION 4: This section contains step by step instructions for participating in the experiment, so that the experience is easy & simple for the participants.
  - Step 1: In this step, we ask the participant to go through a 5-minute video on you tube that contains the detailed instructions for participating in the experiment. We provide a link to the video, to enable easy access.
  - Step 2: Here, we ask the participant to open the interactive tool that has been assigned to them, which contains the data to answer the quiz. They open the tool by clicking on the link provided.
  - Step 3: Here, we ask the participant to open the Kahoot quiz and provide the game pin for opening the Kahoot quiz. We provide the time available (4 minutes/question) for the quiz questions and ask the participants to answer the quiz using the data from the interactive tool that has been assigned to them.
  - Step 4: Here, we ask the participant to respond to the survey administered in Question pro, to finish the experiment. The instructions read as follows" After completion of Quiz, you reach the final step where you need to respond to the survey below. Once the survey is completed, you have finished the experiment."

Data Analysis:

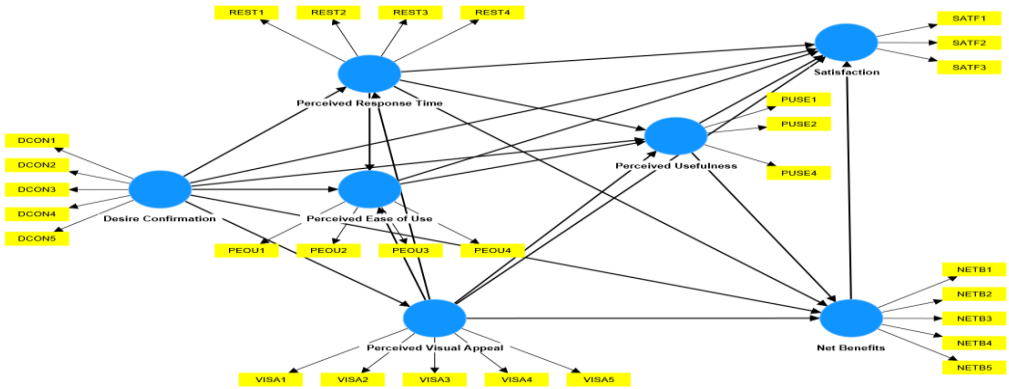
Using Smart-PLS, we first specify our model post which we run a confirmatory Tetrad Analysis (CTA). We look for p-values across indicator combinations and as all the p-values are insignificant, there is over whelming empirical support to specify the models as reflective. For formative constructs, 80% of indicators need to have significant p-values, which is absent. The process involves the construction of 2 path models, one each for artifact A1 & A2. This is followed by the analysis of the quality of results.

To estimate the reputation model in Smart PLS, we initiate a new project and incorporate the accumulated indicator data for the reputation model. Subsequently, we construct the model based on the established hypotheses. The estimation of the PLS path model is facilitated through the utilization of the PLS algorithm. Our data collection process is meticulously designed to ensure the absence of missing data; any participants who discontinue their participation in the experiment are automatically excluded from the data collection process.

We collected ~195 samples across the 2 groups of participants that included B-school students and IT professionals involved in the design/use of self-service BI systems. Post cleanup of the collected data to remove responses that were incomplete or repetitive values, we finally had 176 clean samples from participants, that met the required quality standards.

Upon the evaluation of the collected data's quality for Artifact A1, we allocate 90% of the samples for modelling purposes. The inner model estimation employs a path weighing scheme, and standardized data is employed as the data metric within the SmartPLS package. As the algorithm progresses, it eventually converges to provide model estimates. Subsequently, we retrieve the report for Artifact A1 & Artifact A2 to conduct an in-depth analysis of the results' quality.

Structural Model: Artifact A1



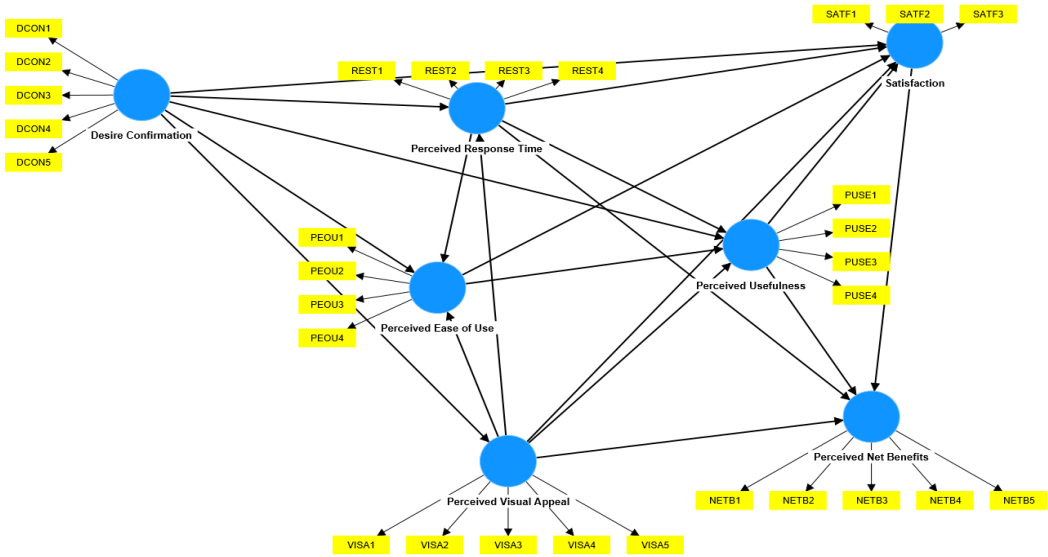
According to the criteria called out for PLS-SEM (Hair, Hult, Ringle, & Sarstedt, 2013), we review measurement model results by evaluating the consistency reliability of the indicators, the indicator reliability, convergent validity (AVE) and discriminant validity.

Measurement model quality Results: Artifact A1

Threshold		0.71	0.50	0.70	0.50	Yes
Latent Variable	Indicators	Loadings	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
Desire Confirmation	DCON1	0.81	0.66	0.90	0.70	Yes
	DCON2	0.89	0.80			
	DCON3	0.87	0.76			
	DCON4	0.86	0.74			
	DCON5	0.75	0.56			
Perceived Net Benefits	NETB1	0.81	0.65	0.87	0.66	Yes
	NETB2	0.84	0.71			
	NETB3	0.83	0.69			
	NETB4	0.85	0.72			
	NETB5	0.72	0.52			
Perceived Ease of Use	PEOU1	0.80	0.63	0.87	0.72	Yes
	PEOU2	0.87	0.75			
	PEOU3	0.88	0.78			
	PEOU4	0.85	0.71			
Perceived Usefulness	PUSE1	0.77	0.59	0.71	0.64	Yes
	PUSE2	0.84	0.70			
	PUSE4	0.79	0.62			

Threshold		0.71	0.50	0.70	0.50	Yes
Latent Variable	Indicators	Loadings	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity
Perceived Response Time	REST1	0.63	0.40	0.82	0.62	Yes
	REST2	0.85	0.72			
	REST3	0.80	0.64			
	REST4	0.85	0.73			
Satisfaction	SATF1	0.88	0.78	0.80	0.71	Yes
	SATF2	0.73	0.54			
	SATF3	0.90	0.82			
Perceived Visual Appeal	VISA1	0.83	0.68	0.88	0.68	Yes
	VISA2	0.77	0.59			
	VISA3	0.86	0.74			
	VISA4	0.87	0.76			
	VISA5	0.79	0.63			

Structural Model: Artifact A2



Measurement model assessments: Artifact A2

We conduct detailed measurement model assessments for Artifact A2, in the same way as the measurement model assessments for Artifact A1(provided in earlier section).

Threshold		0.71	0.50	0.70	0.50	Yes
Latent Variable	Indicators	Loadings	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity (Fornell-Larcker)
Desire Confirmation	DCON1	0.830	0.69	0.89	0.685	Yes
	DCON2	0.826	0.68			
	DCON3	0.751	0.56			
	DCON4	0.856	0.73			
	DCON5	0.871	0.76			
Perceived Net Benefits	NETB1	0.909	0.83	0.93	0.769	Yes
	NETB2	0.928	0.86			
	NETB3	0.908	0.82			
	NETB4	0.858	0.74			
	NETB5	0.773	0.60			
Perceived Ease of Use	PEOU1	0.875	0.77	0.89	0.737	Yes
	PEOU2	0.852	0.73			
	PEOU3	0.880	0.77			
	PEOU4	0.828	0.69			
Perceived Usefulness	PUSE1	0.916	0.84	0.92	0.803	Yes
	PUSE2	0.923	0.85			
	PUSE4	0.886	0.78			

Threshold		0.71	0.50	0.70	0.50	Yes
Latent Variable	Indicators	Loadings	Indicator Reliability	Composite Reliability	AVE	Discriminant Validity ((Fornell-Larcker)
Perceived Response Time	REST1	0.670	0.45	0.85	0.659	Yes
	REST2	0.850	0.72			
	REST3	0.849	0.72			
	REST4	0.862	0.74			
Satisfaction	SATF1	0.919	0.84	0.87	0.773	Yes
	SATF2	0.775	0.60			
	SATF3	0.934	0.87			
Perceived Visual Appeal	VISA1	0.786	0.62	0.90	0.699	Yes
	VISA2	0.881	0.78			
	VISA3	0.853	0.73			
	VISA4	0.783	0.61			
	VISA5	0.872	0.76			

The quality of the results of the measurement model for A1 & A2 passed our set criteria. The outer loadings of the indicator REST1 was 0.63 for A1 (marginally less than 0.7) and 0.67 for A2 (marginally less than 0.7), but we choose to retain this indicator as it is a critical indicator measuring perceived Response Time and dropping this is not adding to composite reliability/AVE.

Structural model quality Results:

- We assess the structural model quality by reviewing the significance of the path-coefficients. Given the exploratory nature of our study, conducted with a smaller sample size in an experimental setup, we adopt significance levels of 10% to 15%.
- We then check for collinearity issues in the structural model (by checking if VIF>5, check for co-efficient of determination(R-Square), effect size(F-Square) etc.

Significance of Path Co-efficients: Artifact A1

Path	T-Statistics	P-Values	Significance
Desire Confirmation -> Net Benefits	0.301	0.763	**NS**
Desire Confirmation -> Perceived Ease of Use	3.435	0.001	***
Desire Confirmation -> Perceived Response Time	1.460	0.144	**NS**
Desire Confirmation -> Perceived Usefulness	2.733	0.006	***
Desire Confirmation -> Perceived Visual Appeal	11.319	0.000	***
Desire Confirmation -> Satisfaction	4.105	0.000	***
Net Benefits -> Satisfaction	0.261	0.794	**NS**
Perceived Ease of Use -> Perceived Usefulness	6.233	0.000	***
Perceived Ease of Use -> Satisfaction	1.473	0.141	**
Perceived Response Time -> Net Benefits	0.431	0.666	**NS**
Perceived Response Time -> Perceived Ease of Use	0.107	0.915	**NS**
Perceived Response Time -> Perceived Usefulness	2.480	0.013	***
Perceived Response Time -> Satisfaction	1.579	0.114	**
Perceived Usefulness -> Net Benefits	6.066	0.000	***
Perceived Usefulness -> Satisfaction	1.478	0.139	**
Perceived Visual Appeal -> Net Benefits	0.437	0.662	**NS**
Perceived Visual Appeal -> Perceived Ease of Use	1.577	0.115	**
Perceived Visual Appeal -> Perceived Response Time	3.920	0.000	***
Perceived Visual Appeal -> Perceived Usefulness	0.606	0.544	**NS**
Perceived Visual Appeal -> Satisfaction	2.059	0.040	***

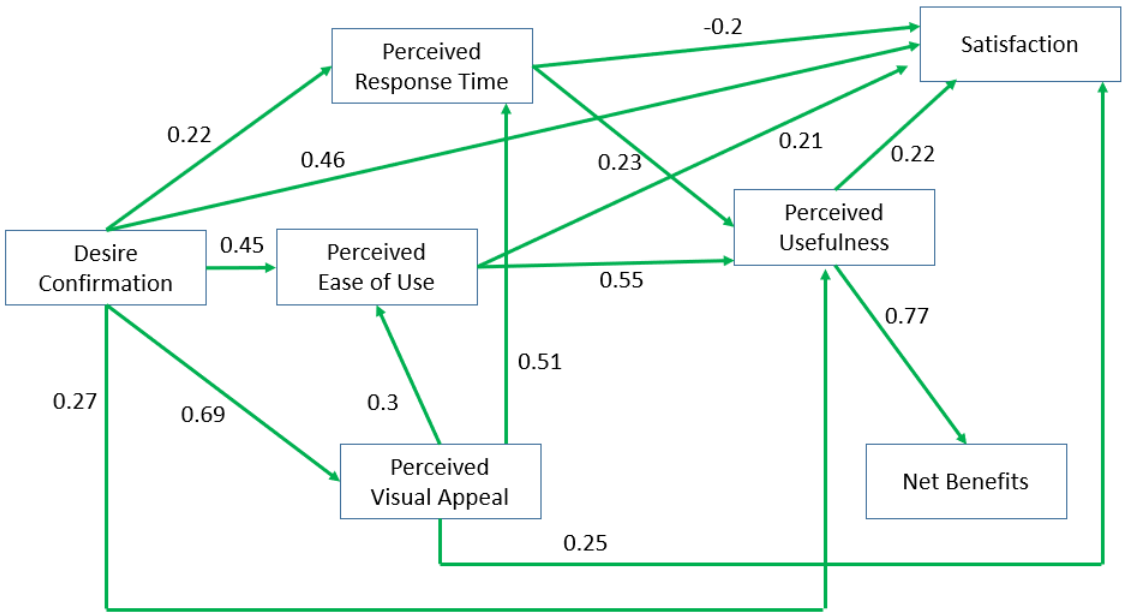
NS: Not Significant

Significance of Path Co-efficients: Artifact A2

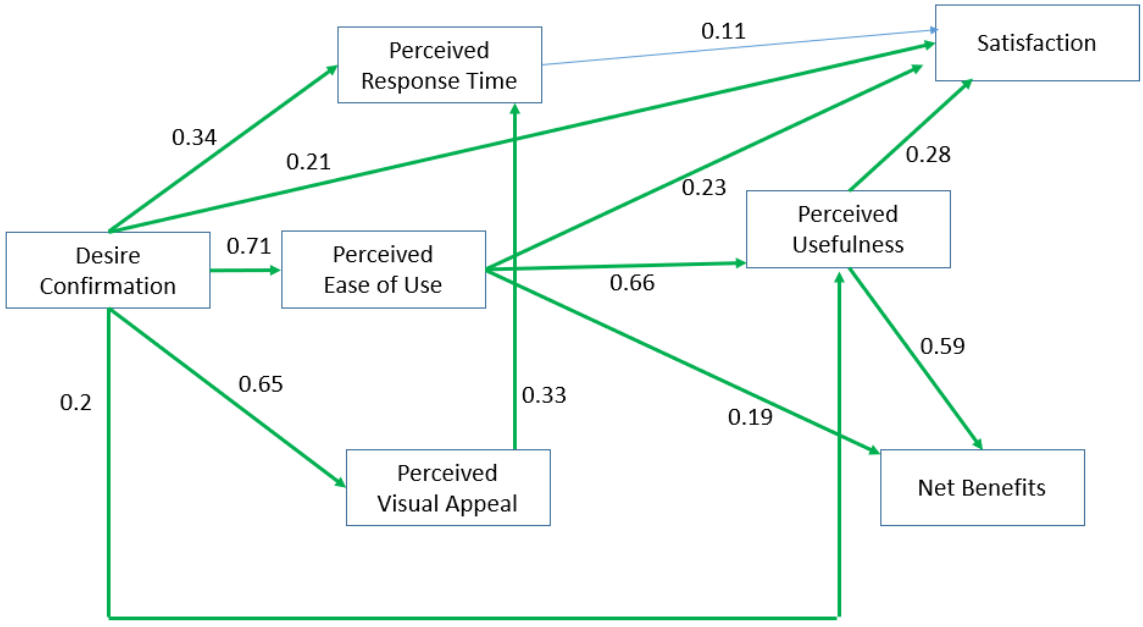
Path	T statistics	P values	Significance
Desire Confirmation -> Perceived Ease of Use	5.126	0.000	***
Desire Confirmation -> Perceived Response Time	2.280	0.023	***
Desire Confirmation -> Perceived Usefulness	2.010	0.045	***
Desire Confirmation -> Perceived Visual Appeal	8.636	0.000	***
Desire Confirmation -> Satisfaction	1.822	0.069	***
Perceived Ease of Use -> Perceived Usefulness	6.581	0.000	***
Perceived Ease of Use -> Satisfaction	2.377	0.017	***
Perceived Response Time -> Perceived Ease of Use	0.328	0.743	NS
Perceived Response Time -> Perceived Net Benefits	0.123	0.902	NS
Perceived Response Time -> Perceived Usefulness	0.367	0.713	NS
Perceived Response Time -> Satisfaction	1.227	0.220	NS
Perceived Usefulness -> Perceived Net Benefits	6.911	0.000	***
Perceived Usefulness -> Satisfaction	3.034	0.002	***
Perceived Visual Appeal -> Perceived Ease of Use	0.387	0.699	NS
Perceived Visual Appeal -> Perceived Net Benefits	0.394	0.694	NS
Perceived Visual Appeal -> Perceived Response Time	2.185	0.029	***
Perceived Visual Appeal -> Perceived Usefulness	1.208	0.227	NS
Perceived Visual Appeal -> Satisfaction	0.295	0.768	NS
Satisfaction -> Perceived Net Benefits	1.950	0.051	***

NS: Not Significant

Model for Artifact A1: Significant Hypotheses with Path Co-efficients in GREEN



Model for Artifact A2: Significant Hypotheses with Path Co-efficients in GREEN



Discussions of Results:

Basis the significant relationships in models A1 and A2 and their path coefficients, we can make the inferences below:

- For Artifact A1 (Faster Response Time, Good Visual Appeal), Perceived Visual Appeal is a more significant driver of Satisfaction vs Perceived Response Time, whose significance is quite low. Perceived Visual Appeal has a strongly significant relationship with Satisfaction, while Perceived Response Time has a weakly significant relationship with Satisfaction.
- In artifact A2 (Poor Response Time, Good Visual Appeal), the impact of "Perceived Visual Appeal" on Satisfaction is completely suppressed or made insignificant. This implies that both Visual Appeal &

Response Time should jointly be superior for "Visual Appeal" to significantly influence Satisfaction. This is a key insight for designers/developers, while making trade off decisions between Response time and Visual Appeal.

- If the designer tunes Visual Appeal as superior and trades off on Response Time to be poor (as in artifact A2), the effect of the superior visual appeal would have no impact on Satisfaction.
- This allows us to conclude that "Perceived Visual Appeal" is relatively a more important influencer of Satisfaction than "Perceived Response Time" in driving Satisfaction.
- In Artifact A1 (Fast Response Time, Good Visual Appeal), while there is no direct significant effect of "Perceived Response Time" on "Perceived Net Benefits", it can be seen that "Perceived Response Time" influences "Perceived Net Benefits" by moderating through "Perceived Usefulness
- This implies that, under a condition, where the Response Time is fast (as in A1), Perceived Response Time is a more significant influencer of Perceived Net Benefits in comparison to "Perceived Visual Appeal".
- Under a condition, where the Response time is poor (as in A2), Perceived response time loses all its impact on Perceived Net Benefits and Perceived Visual Appeal has a relatively higher influence on Perceived Net Benefits (for A2, the total effect size of Perceived Visual Appeal on Perceived Net Benefits is higher in comparison to Perceived Response Time)
- When Response time shifts from fast (A1) to slow(A2), under a condition where the Visual appeal is Good, the relationship between Perceived Visual Appeal and Perceived Ease of Use becomes insignificant. So, the benefits of the Good Visual Appeal don't translate into enhanced ease of use, under a condition where the Response Time deteriorates.
- Across both the artifacts (A1 & A2), there is a significant relationship that exists between Perceived Visual Appeal and Perceived Response Time. This is highlighting the fact that the way the artifacts look in terms of visual appeal has a significant influence on how the users perceive Response Time.
- When Response time shifts from fast (A1) to slow(A2), the influence of desire confirmation on Satisfaction drops to half, while the effect of Perceived Ease of Use and Perceived Usefulness on Satisfaction increases. So, when Response Time shifts from fast (A1) to slow (A2), there is much lesser confirmation of desire and with 'ease of use' getting difficult, the effect size of "Perceived Ease of use" and 'Perceived Usefulness" on Satisfaction increases.
- When Response time is poor (A2), Perceived Ease of Use has a much higher effect on Perceived Usefulness

Basis the inferences, we can conclude that "Perceived Visual Appeal" is relatively a more important influencer of Satisfaction than "Perceived Response Time" in driving Satisfaction. Since Perceived Response Time influences Perceived Net Benefits only under a condition of the response time being faster, while in other case the influence of Perceived Visual Appeal is stronger, it can be concluded that Perceived Visual Appeal is relatively a stronger influencer of Satisfaction & Net Benefits. This conclusion is also because Satisfaction is a more critical outcome measures in relation to perceived Net Benefits, as satisfaction affects behavioural intentions like 'continued use'.

We thus establish that we have been successfully able to decompose the established constructs of System Quality in IS literature (that is driving Satisfaction and Perceived Net Benefits) into two major sub-constructs of 'Perceived Visual Appeal' and 'Perceived Response Time'. We have been able to conclude that 'Perceived Visual Appeal' and 'Perceived Response Time' are significant drivers of Satisfaction and Perceived Net Benefits, ascertaining the conditions under which the relationships are significant. We can convincingly conclude that 'Perceived Response Time' plays a decisive role in influencing the relationship between 'Perceived Visual Appeal' and 'Satisfaction'. This is the core research question that we set out to answer and we have been able to convincingly answer this question powered by 2 PLS-SEM models processing data from ~176 respondents who have participated in a self-service BI experiment.

Contributions to IS literature, practice & future research directions:

Some of the key contributions by our study to the field of IS literature include the below.

- We have been able to **establish 'Desire' as an effective alternative to 'Expectation' in extended ECT based IS Continuance research**. We have also been able to establish that the relationships involving 'desire confirmation' are all significant**.** While this is inspired by the desire disconfirmation theory (Khalifa & Liu, 2002) and the work on desire confirmation ((Chin & Lee, 2000), this is the first time, desire is used as a replacement for 'expectation' in an extended ECT based IS Continuance model that studies the role of the subconstructs of system quality on IS Satisfaction.
- **Contributions to TAM:** Constructs like 'Perceived Visual Appeal' enhances the 'ease of Use', adding a dimension of what users feel to the existing angles of what the users think. Perceived Visual appeal & Perceived Response time are system quality elements that help us predict better, the behavioral intent of a user & in turn how their satisfaction, perceived usefulness, perceived ease of use, Perceived Net benefits are impacted. There is variance in the relationships between TAM constructs and system quality elements like Perceived Visual Appeal and Perceived Response Time, depending on how fast the system has been set up to function. As a future research direction, it will be worthwhile to explore if there are variances depending on how appealing the Visuals of the systems are designed.
- **DeLone and McLean** have highlighted that there is a need to significantly reduce the number of measures used to determine IS success so that there are opportunities to compare the research results and validate the findings. In our research, we have fully focused on System Quality elements and collapsed system quality into elements like 'Perceived Visual Appeal' and 'Perceived Response Time', while controlling for other aspects like Information Quality, flexibility etc. Our targeted deep dive into SYSTEM QUALITY with an actionability focus, while controlling for other constructs, leveraging an experimentation methodology, is a significant contribution to the extension of D&M IS success model,
- If we review the diverse range of technologies examined in the research on Satisfaction / continuance intention with IS, we do not find technologies like self-service BI systems. Moreover, there is no experimentation-based study in this space that is widely present. Bringing this together, this is the first of its kind experimentation-based methodology, in the area of self-service BI systems.
- Practitioners who design and implement systems will benefit from a better understanding of the relative influence of response time and visual appeal, in driving satisfaction & perceived net benefits. Systems professionals can utilize this knowledge to design systems and implementation methodologies that users are more likely to accept & adopt.

In future, researchers can explore to repeat this study by altering visual appeal, alongside response time to study the impact on the relationships. We can explore if these relationships vary by gender, age, educational qualifications, or work experience. There is also an opportunity for researchers to explore if there are behavioural variations between users, who use self-service BI systems on laptops vs mobile. While we do believe the findings related to self-service BI systems can be applicable to other similar technologies like websites, web apps, mobile apps, it is important to validate the findings in the context of other technologies before we can extend the findings into those areas.

References

[1] Bailey, J., & Pearson, S. (1983). Development of a Tool for Measuring and Analyzing Computer User Satisfaction. *Management Science, 29*(5), 530-545.

[2] Baker, A. (2020, February 7). *The Most Watched Sporting Events in The World*. Retrieved from roadtrips.com: https://www.roadtrips.com/blog/the-most-watched-sporting-events-in-the-world/

[3] Balakumar. (2020, December 16). *Year in review: In 2020, OTT platforms came of age in India*. Retrieved from techradar.com: https://www.techradar.com/in/news/year-in-review-when-ott-platforms-in-india-came-of-age#:~:text=As%20on%20December%2C%20India%20has,multi%2Dmillion%20dollar%20entertainment%20arena.

[4] Bergmann, M., Macada, A., Oliveira Santini, F., & Rasul, T. (2023). Continuance intention in financial technology: a framework and meta-analysis. *International Journal of Bank Marketing, 41*(4), 749-786.

[5] Bhattacherjee, A. (2001a). Understanding information systems continuance: An expectation-confirmation model. *Management Information Systems Quarterly, 25*(3), 351–370.

[6] Bhattacherjee, A. (2001b). An empirical analysis of the antecedents of electronic commerce service continuance. *Decision Support Systems, 32*(2), 201–214.

[7] Broadcast Audience Research Council(BARC), India. (2018). *IPL Over the Years.* BARC, India.

[8] Campbell, A., & Pisterman, S. (1996). A Fitting Approach to Interactive Service Design: The Importance of Emotional Needs. *Design Management Journal (Former Series), 7*(4), 10-14.

[9] Chou, C.-J., & Conley, C. (2009). Engaging Experience: A New Perspective of User Experience with Physical Products. In *Kurosu M. (eds) Human Centered Design. HCD 2009. Lecture Notes in Computer Science* (Vol. 5619, pp. 31-40). Springer, Berlin, Heidelberg. doi:https://doi.org/10.1007/978-3-642-02806-9_5

[10] Cockton, G., Hvannberg, E., & Law, E. (2008). *Maturing Usability. Quality in Software, Interaction and Value.* Heidelberg: Springer.

[11] Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

[12] Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

[13] DeLone, W., & McLean, E. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60-95.

[14] DeLone, W., & McLean, E. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*, 9-30.

[15] Doll, W., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly*, 259-274.

[16] Doong, H., & Lai, H. (2008). Exploring usage continuance of e-negotiation systems: Expectation and disconfirmation approach. *Group Decision and Negotiation, 17*(2), 111–126.

[17] Eraslan, E. (2009). Usability Evaluation of Mp3/CD Players: A Multi-Criteria Decision Making Approach. In *M. Kurosu (Ed.): Human Centered Design, HCII 2009, LNCS* (Vol. 5619, pp. 55-64). Springer-Verlag Berlin Heidelberg.

[18] Hair, J., Hult, G., Ringle, C., & Sarstedt, M. (2013). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Thousand Oaks: Sage.

[19] Hassenzahl, M., & Tractinsky, N. (2006). User experience – a research agenda. *Behaviour & Information Technology, 25*(2), 91-97.

[20] Hayashi, A., Chen, C., Ryan, T., & Wu, J. (2004). The role of social presence and moderating role of computer self efficacy in predicting the continuance usage of e-learning systems. *Journal of Information Systems Education, 15*, 139–154.

[21] Islam, A. (2012). The Role of Perceived System Quality as Educators' Motivation to Continue E-learning System Use. *AIS Transactions on Human-Computer Interaction, 4(1)*, 25-43.

[22] Islam, A., Mäntymäki, M., & Bhattacherjee , A. (2017). Towards a Decomposed Expectation Confirmation Model of IT Continuance: The Role of Usability. *Communications of the Association for Information Systems, 40*(23), 502-523.

[23] Jennings, M. (2000). Theory and Models for creating engaging and immersive ecommerce websites. *SIGCPR '00: Proceedings of the 2000 ACM SIGCPR conference on Computer personnel research*, (pp. 77-85). doi:https://doi.org/10.1145/333334.333358

[24] Laghate, G. (2020, November 21). *Almost half of Indian TV viewers watched IPL 2020*. Retrieved from economictimes: https://economictimes.indiatimes.com/industry/media/entertainment/almost-half-of-indian-tv-viewers-watched-ipl-2020/articleshow/79323814.cms?from=mdr

[25] Limayem, M., Hirt, S., & Cheung, C. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS quarterly, 31*(4), 705-737.

[26] Lingaard, G., & Dudek, C. (2002). High appeal versus high usability: Implications for user satisfaction. *HF2002 Human Factors Conference*, (pp. 25-27). Melbourne, Australia.

[27] Loiacono, E., Watson, R., & Goodhue, D. (2007). WebQual: An instrument for consumer evaluation of web sites. *International journal of electronic commerce, 11*(3), 51-87.

[28] Miller, R. (1968). Response time in man-computer conversational transactions. *In Proceedings of the December 9-11, 1968, fall joint computer conference*, *Part 1*, pp. 267-277.

[29] Nabavi, A., Taghavi-Fard,, M. T., Hanafizadeh, P., & Taghva, M. R. (2016). Information Technology : A Systematic Literature Review. *International Journal of E-Business Research, 12*(1), 57-93.

[30] Oliver, R. (1989). Processing of the satisfaction response in consumption: a suggested framework and research propositions. *Journal of consumer satisfaction, dissatisfaction and complaining behavior*, 1-16.

[31] Oliver, R., & DeSarbo, W. (1988). Response determinants in satisfaction judgments. *Journal of consumer research, 14*(4), 495-507.

[32] Rahi, S., Alghizzawi, M., & Ngah, A. (2023). Factors influence user's intention to continue use of e-banking during COVID-19 pandemic: the nexus between self-determination and expectation confirmation model. *EuroMed Journal of Business, 18*(3), 380-396.

[33] Rosenzweig, P. M. (2014). *The Halo Effect and the Eight Other Business Delusions That Deceive Managers.* New York, NY:: Free Press.

[34] Seligman, M. E., & Csikszentmihalyi , M. (2000). Positive Psychology. *American Psychologist, 55*(1), 5-14. doi:10.1037//0003-066X.55.1.5

[35] Seow, S. (2008). *Designing and Engineering Time: The psychology of time perception in software.* Addison-Wesley.

[36] Suh, K., Kim, S., & Lee, J. (1994). End-user's disconfirmed expectations and the success of information systems. *Information Resources Management Journal (IRMJ), 7*(4), 30-39.

[37] Thong, J. Y., Hong, S.-J., & Tam, K. Y. (2006). The effects of post-adoption beliefs on the expectation confirmation model for information technology continuance. *International Journal of Human-Computer Studies, 64*(9), 799–810.

[38] Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Towards a unified view. *MIS Quarterly, 27*(3), 425–478.

[39] Whiteside, J., & Wixon, D. (1987). The Dialectic of Usability Engineering. *In INTERACT 87 – 2nd IFIP International Conference on Human - Computer Interaction*, (pp. 17-20). Stuttgart, Germany.

[40] Zen, M., & Vanderdonckt , J. (2016). *Assessing User Interface Aesthetics based on the Inter-subjectivity of Judgment.* Proceedings of the 30th International BCS Human Computer Interaction Conference (HCI).