

The Impact of the Mixture of Media Types on Perceived Diagnosticity in Crowdfunding

Project Complexity as a Moderator

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Abstract—This study investigates the impacts of the usage of the mixture of media types on perceived diagnosticity, as well as the moderating effect of project complexity in the context of crowdfunding. Laboratory experiments are used to test the hypotheses. Results show that (1) perceived diagnosticity is a strongly positive predictor of the investment intention; (2) compared with a combination of fewer media types, a combination of more media types used in a project presentation leads to a higher perceived diagnosticity of the project presentation; (3) the effect level of the mixture of media types on perceived diagnosticity could be moderated by project complexity.

Keywords—Crowdfunding; Perceived diagnosticity; Mixture of media types; Project complexity

I. INTRODUCTION

Compared with traditional e-commerce or other Internet-based services, crowdfunding has a unique feature that crowdfunding projects usually target the production of in-progress (i.e., not yet matured) items. This feature generally leads to the shortage of project-related reviews from prior participants or third parties in a crowdfunding investment. The project webpage is practically the sole information source on which investors base their judgment of the project. Hence, investors' understanding and diagnosis of the project's online presentation play important roles in their decision making.

Regardless of the information volume, this study attempts to investigate the relationship among the combination of media types used in a project webpage, perceived diagnosticity of the project, and investment intention in the context of crowdfunding. In addition, the potential association between the mixture of media types and perceived diagnosticity might be influenced by the project complexity. Hence, this study also shed light on the moderating effect of project complexity.

II. HYPOTHESES

A. The Mixture of Media Types Used in a Project Presentation

According to the media richness theory (MRT), each type of medium has a certain level of ability to convey

information cues [1-2]. For example, the information-carrying-capacity of audio media and image is generally stronger than plain text or numerical code. Video clips, being a rich media, usually could convey more information cues than audio or other media types.

In this case, we could reasonably infer that the more types of rich media are applied in a project presentation, the more information cues (i.e., project attributes) will be demonstrated [3-4]. In other words, a mixture of various media types (e.g., text-image-video) may give rise to a higher ability of the project presentation to convey relevant project information cues, which may contribute to a more diagnostic project presentation and their consequent decision making.

B. Perceived Diagnosticity of a Project

To examine the extent to which information delivered by a project presentation could be perceived as relevant and useful for judging the quality of the project [5-6], this study employed the construct of perceived diagnosticity. Feldman and Lynch [5] indicated that perceived diagnosticity of some specific information could be conceptualized as the likelihood of using that information for subsequent judging or decision making.

Jiang and Benbasat [7] applied perceived diagnosticity to the context of e-commerce. They described perceived diagnosticity as e-commerce consumers' perception of the capacity of a website to deliver product attribute information that could help them understand and evaluate the product featured on the website. The more the relevant product attributes are presented, the higher the degree of information helpfulness in evaluating the online product, and the more the website will be perceived as diagnostic [7-8]. Similarly, the project presentation is expected to be diagnostic for judging the project in crowdfunding. In this study, perceived diagnosticity refers to the extent to which individuals perceive a project presentation as having the ability to deliver relevant project information that assists them in understanding and evaluating the quality of the project [7].

Compared with a project presentation involving fewer media types, a project presentation with more media types (e.g., text-image-video) may have a relatively higher probability of carrying relevant project information. In turn,

it may be perceived as being more capable of enabling an adequate judgment of the project. Hence, we hypothesize the following:

H1: A mixture of more media types used in a project presentation will lead to a higher level of perceived diagnosticity of the project.

Prior studies have indicated that perceived diagnosticity directly or indirectly exerts influence on users' behavior intention both in the context information systems. For example, Jiang and Benbasat [9-10] revealed the positive impacts of a diagnostic web page on consumer's online purchase intention in 2007. In addition, Wang and Chang [11] examine the role of perceived diagnosticity in the context of social commerce and indicated that perceived diagnosticity contributing to consumer's high probability of purchase intention.

In this study, we assume that research findings from e-commerce and other information systems field might be also available in the context of crowdfunding. Thus, we derived the following hypothesis:

H2: Perceived diagnosticity of a project has a positive relationship with investment intention.

C. The Moderating Effect of Project Complexity

To a large extent, the amount of information cues required in decision-making depends on the project complexity. That is, a simple item (e.g., a teacup) has relatively fewer features that might be useful for understanding and evaluating it; while a complex item (e.g., a 3D printer) has relatively more attributes. Reasons behind this phenomenon might attribute to complex items easily lead to relatively greater uncertain or risky perceptions [12-13]. In the context of crowdfunding, concerning the relationship between the mixture of media types used in a project webpage and perceived diagnosticity, different levels of project complexity might lead to different results.

In particular, for a simple project, a project webpage with a combination of more media types might not have obvious advantage rather than a webpage with fewer media types in increasing perceived diagnosticity. However, for a complex project, a project page with a mixture of more media types might exert more significant influences on perceived diagnosticity rather than a project with fewer media types. Hence, we hypothesize as the following:

H3: The impact of the mixture of media types used in a project on perceived diagnosticity will be more prominent in terms of a complex project rather than a simple project.

The research model is shown in Fig. 1.

III. RESEARCH METHOD

A. Experimental Project Design

Laboratory experiments were designed and conducted to collect data. Two groups of four project pages each were designed to imitate raising money for a teacup and a 3D printer, respectively. In reality, investors commonly judge the teacup from its five key attributes such as profile, color, volume, weight, and the material. However, investors may understand the 3D printer from more than ten features (e.g., structure, module, size, weight, print nozzle, production, available material to name just a few). Thus, the teacup represents a project in relatively low complexity while the 3D printer represents a project in high complexity in this study.

For the two groups of experimental projects, four combinations of media types were identified. They were: (1) plain text (text), (2) text and image (text-image), (3) text and video (text-image), and (4) text, image, and video (text-image-video). As a result, a 4x2 experiment design was conducted (i.e., 4 mixtures of media types [between-subject] x 2 groups of projects [within-subject]) (Table I).

B. Experimental Procedures

A total of 116 volunteers were recruited as experimental subjects from China. Firstly, they were randomly assigned to four experimental conditions, with 26-31 subjects in each condition. And then, they were required to exchange the order. The subjects were also asked finishing the post-experiment questionnaire.

C. Measurement

In the post-experiment questionnaire, measurement items of perceived diagnosticity were adapted from [7][9]. Items of investment intention were derived from [14-15]. All the items were rephrased to fit the crowdfunding settings. 7-point Likert scales were used for items.

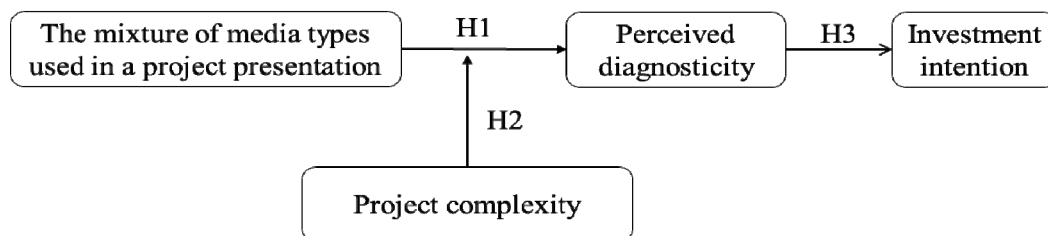


Fig. 1. Research Model.

TABLE I. EXPERIMENT DESIGN -MIXTURE OF MEDIA TYPES

Text	Text- image	Text-video	Text-image-video
A1	A2	A3	A4
B1	B2	B3	B4

^a Note: A1–A4, form the first group of projects (low complexity: teacup), and
^b B1–B4, constitute the second group of projects (high complexity: 3D printer).

IV. DATA ANALYSIS

A. Demographic Characteristics

Among the 116 subjects, 37 (32%) were female and 79 (68%) were male. The average age of the subjects was 21.8 years. The difference between gender distribution across the eight experimental sessions was non-significant.

B. Results of Perceived Diagnosticity on Investment Intention

The partial least squares (PLS) path modeling method was employed to examine the hypothesized relationships. First, the reliability of measurement items was checked. Table II shows that all item cross loadings were above 0.7, indicating adequate reliability.

Second, the convergent validity was examined by checking the composite reliability (CR) and the Cronbach’s alpha of each latent variable. All the CR and Cronbach’s alpha values exceeded 0.7 (Table III), indicating the establishment of convergent validity.

TABLE II. CROSS LOADINGS OF MEASUREMENT ITEMS

Items	Perceived diagnosticity (PD)	Investment intention (INT)
PD01	0.897	0.782
PD02	0.923	0.778
PD03	0.888	0.727
INT01	0.715	0.849
INT02	0.752	0.895
INT03	0.743	0.869
INT04	0.741	0.880
INT05	0.728	0.862

Further, the discriminant validity was evaluated by examining the average variance extracted (AVE). The squared roots of AVEs in the diagonal vector of Table III exceeded the corresponding correlations, establishing discriminant validity.

Meanwhile, the path strength and significance were examined by PLS as well. Result showed that perceived diagnosticity exerts significantly positive influence on investment intention (path coefficient=0.845; $p<.000$), with an explanatory power of 71.4% (Fig. 2); thus, H3 is supported.

TABLE III. CONVERGENT VALIDITY AND DISCRIMINANT VALIDITY

	Cronbach’s alpha	CR	Perceived diagnosticity	Investment intention
Perceived diagnosticity	0.887	0.93	0.903	
Investment intention	0.920	0.94	0.845	0.871

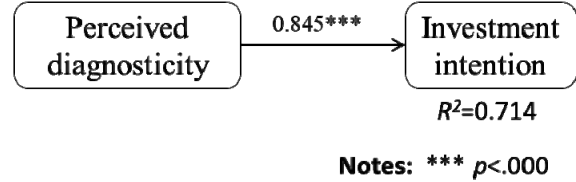


Fig. 2. Structure model.

C. Results on Perceived Diagnosticity

Analysis of variance (ANOVA) was used to calculate the perceived diagnosticity of a project. Results indicated that the mixture of media types, project complexity, and the interaction between them all have significant impacts on perceived diagnosticity (Table IV).

TABLE IV. ANOVA RESULTS ON PERCEIVED DIAGNOSTICITY

Source	df	Summary square	Mean square	F	Sig.
Between subjects The mixture of media types	3	141.12	47.04	244.890	.000***
Within subjects Project complexity	1	1.01	1.01	5.276	.0225 *
Project complexity * The mixture of media types	3	27.96	9.32	48.525	.000***

^c Notes: *** $p<.000$, * $p<.05$

Next, further analysis was conducted to examine how different levels of the mixture of media types exert influences on perceived diagnosticity. Based on Tukey HSD test, *post hoc* analysis results showed that a combination of more media types indeed contributes to a higher level of perceived diagnosticity (i.e., text-image-video > text-video > text-image > text) (Table V); thus, H1 is supported.

Further, the significant interaction impact (Table IV) indicates that the relation between the mixture of media types and perceived diagnosticity might be moderated by project complexity; hence, it should be checked in more detail. Results in Table VI and Table VII confirmed the moderating role of project complexity.

TABLE V. TUKEY HSD TEST RESULTS ON PERCEIVED DIAGNOSTICITY

Basic group (B) [Ⓓ]	Compared groups (C) [Ⓔ]	Mean difference (D=C-B) [Ⓔ]	Sig.	95% confidence interval	
				Lower bound	Upper bound
[1] Text (mean: 3.044)	[2]	1.289	.000***	1.018	1.559
	[3]	1.714	.000***	1.446	1.982
	[4]	2.024	.000***	1.756	2.292
[2] Text-image (mean: 4.333)	[1]	-1.289	.000***	-	-
	[3]	0.425	.000***	0.152	0.697
	[4]	0.735	.000***	0.463	1.008
[3] Text-video (mean: 4.758)	[1]	-1.714	.000***	-	-
	[2]	-0.425	0.697	-	-
	[4]	0.310	.017*	0.040	0.580
[4] Text-image-video (mean: 5.068)	[1]	-2.024	.000***	-	-
	[2]	-0.735	.000***	-	-
	[3]	-0.310	.017*	-	-

^d. Notes: *** $p < .000$, * $p < .05$

^c. (B): Basic group. Report the mean of perceived diagnosticity in 4 combinations of media types, respectively.

^f. (C): Compared groups. For each basic group, there are three different mean of perceived diagnosticity based on different mixture of media types.

^e. (D=C-B): Mean difference between compared groups and basic group.

Specifically, when project complexity is low, the effects of some combinations of media types on perceived diagnosticity are nonsignificant (i.e., text-image vs. text-video; text-video vs. text-image-video) (Table VI). When project complexity is high, the project page with a mixture of more media types exerts more significantly positive influence on perceived diagnosticity rather than the project with fewer media types (Table VII). Thus, H2 is supported.

V. DISCUSSION

A. Theoretical Implications

The findings of this study contribute to the literature on perceived diagnosticity by revealing the important roles of perceived relevance and utilization of the project presentation in investors' understanding and evaluation of the project. A higher level of perceived diagnosticity exerts a significant influence on investors' positive decision making. This finding is consistent with that of Jiang and Benbasat [9] in the e-commerce setting. Thus, this study contributes to the academic research on perceived diagnosticity by successfully using it in the context of crowdfunding.

This study also contributes to the media richness theory by successfully applied it to the crowdfunding settings. A combination of more media types (e.g., text-image-video) used in a project presentation will lead to a higher level of perceived diagnosticity rather than only a combination of fewer media types. This finding might be helpful for

researchers in the field of crowdfunding or other Internet-based services.

TABLE VI. TUKEY HSD TEST RESULTS ON PERCEIVED DIAGNOSTICITY- LOW PROJECT COMPLEXITY

Basic group (B) [Ⓓ]	Compared groups (C) [Ⓔ]	Mean difference (D=C-B) [Ⓔ]	Sig.	95% confidence interval	
				Lower bound	Upper bound
[1] Text (mean: 3.655)	[2]	0.749	.000***	0.481	1.016
	[3]	0.965	.000***	0.700	1.230
	[4]	1.115	.000***	0.849	1.379
[2] Text-image (mean: 4.404)	[1]	-0.749	.000***	-	-
	[3]	0.216	.163	-	-
	[4]	0.366	.003**	0.095	0.634
[3] Text-video (mean: 4.620)	[1]	-0.965	.000***	-	-
	[2]	-0.216	.163	-	-
	[4]	0.150	.465	-	-
[4] Text-image-video (mean: 4.770)	[1]	-0.485	.000***	-	-
	[2]	-0.366	.003**	-	-
	[3]	-0.150	.465	-	-

^h. Notes: *** $p < .000$, ** $p < .01$

TABLE VII. TUKEY HSD TEST RESULTS ON PERCEIVED DIAGNOSTICITY-HIGH PROJECT COMPLEXITY

Basic group (B) [Ⓓ]	Compared groups (C) [Ⓔ]	Mean difference (D=C-B) [Ⓔ]	Sig.	95% confidence interval	
				Lower bound	Upper bound
[1] Text (mean: 2.433)	[2]	1.829	.000***	1.498	2.158
	[3]	2.463	.000***	2.136	2.790
	[4]	2.935	.000***	2.607	3.261
[2] Text-image (mean: 4.262)	[1]	-1.829	.000***	-	-
	[3]	0.634	.000***	0.301	0.967
	[4]	1.106	.000***	0.773	1.438
[3] Text-video (mean: 4.896)	[1]	-2.463	.000***	-	-
	[2]	-0.634	.000***	-	-
	[4]	0.472	.002**	0.141	0.801
[4] Text-image-video (mean: 5.368)	[1]	-2.935	.000***	-	-
	[2]	-1.106	.000***	-	-
	[3]	-0.472	.002**	-	-

ⁱ. Notes: *** $p < .000$, ** $p < .01$, * $p < .05$

In addition, this study examined the moderating effect of project complexity. Results indicated that the impact of the combination of media types on perceived diagnosticity will be more prominent in terms of a complex project rather than

a simple project. To some extent, the finding of this study contributes to the literature of crowdfunding by considering project complexity as a moderator in the funding decision-making process.

B. Practical Implications

Founding of this study also provide some useful implications for crowdfunding practitioners. For example, this study reports that a project presentation with a combination of more media types could increases the perceived relevance and utilization of information conveyed by the project presentation for judging the quality of the project. In this case, crowdfunding founders have the responsibilities to provide information that is as rich as possible by combining various media types in the project presentation to increase investors' understanding of the project.

In addition, project complexity showed significant moderating effects on the association between the combination of media types and perceived diagnosticity. It means that when simple projects were launched on crowdfunding platforms, a mixture of text and image might be enough to deliver most of the useful information cues for decision-making. However, when relatively complex projects were launched, a combination of more media types (e.g., text-image-video) might be a better solution because such a combination could furthest promote individual's perceived diagnosticity.

VI. CONCLUSION

This study investigated the impacts of the usage of the mixture of media types on perceived diagnosticity, as well as the moderating effect of project complexity in the context of crowdfunding.

Findings of this study showed that: First, perceived diagnosticity is a significantly positive predictor of crowdfunding investment intention. Second, compared with a combination of fewer media types, a combination of more media types used in a project webpage contributes to a higher level of perceived diagnosticity. Finally, the effect level of the mixture of media types on perceived diagnosticity could be moderated by project complexity---relatively complex projects were more prominent.

This study contributes to the theory development of perceived diagnosticity in the context of crowdfunding. It also contributes to the literature of crowdfunding by considering project complexity as a moderator. In addition, it

also equips crowdfunding practitioners with available suggestions.

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