

RGC Ref. No.: <u>UGC/FDS24/H03/17</u> (please insert ref. above)
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**RESEARCH GRANTS COUNCIL
COMPETITIVE RESEARCH FUNDING SCHEMES FOR
THE LOCAL SELF-FINANCING DEGREE SECTOR**

FACULTY DEVELOPMENT SCHEME (FDS)

Completion Report

(for completed projects only)

<p><u>Submission Deadlines:</u></p> <ol style="list-style-type: none"> 1. Auditor's report with unspent balance, if any: within six months of the approved project completion date. 2. Completion report: within 12 months of the approved project completion date.
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Part A: The Project and Investigator(s)

1. Project Title

Recycling Behaviors: Making Sense of Place Attachment and Spillover Effect

2. Investigator(s) and Academic Department(s) / Unit(s) Involved

Research Team	Name / Post	Unit / Department / Institution
Principal Investigator	WAN Kar-ho / Senior Lecturer	PolyU SPEED*
Co-Investigator(s)	SHEN Qiping / Chair Professor	Department of Building and Real Estate, PolyU
Others	CHOI Wai-fan / Research Assistant	PolyU SPEED

*As reported to the UGC Secretariat, Dr Calvin Wan has departed PolyU SPEED after the project completion.

3. Project Duration

	Original	Revised	Date of RGC / Institution Approval <i>(must be quoted)</i>
Project Start Date	1 January 2019	N/A	N/A
Project Completion Date	31 December 2020	N/A	N/A
Duration <i>(in month)</i>	24	N/A	N/A
Deadline for Submission of Completion Report	31 December 2021	N/A	N/A

Part B: The Final Report**5. Project Objectives**

5.1 Objectives as per original application

1. *To investigate the role of place attachment in explaining recycling behavior*
2. *To examine the mechanisms of recycling behaviors' spillover effect on other pro-environmental behaviors*
3. *To draw policy implications and suggest necessary measures in stimulating recycling behavior and positive spillover behaviors*

5.2 Revised objectives

Date of approval from the RGC: N/A

Reasons for the change: N/A

1. *N/A*

2. N/A

3. N/A

5.3 Realisation of the objectives

(Maximum 1 page; please state how and to what extent the project objectives have been achieved; give reasons for under-achievements and outline attempts to overcome problems, if any)

All objectives have been fully realized. This project is a longitudinal study which consists of two phases of online survey. To address Objective 1, Wave 1 survey tapping participants' attachment to Hong Kong and other attitudinal properties of recycling behavior was conducted in November 2019; 1,102 successful cases were collected. Objective 1 has been fully achieved which the role of place attachment in explaining recycling behavior was investigated and findings were published. Wave 1 survey is also a necessary upstream work for addressing Objective 2 which aims to study the mechanisms of recycling behaviors' spillover effects on other pro-environmental behaviors. This is because pro-environmental behaviors of participants should be measured with at least two timelines to observe whether there are behavioral spillover effects. Wave 2 survey was conducted three months after Wave 1 survey was finished. 467 valid cases were collected for spillover effects analysis. Theoretical mechanisms of spillover effect were investigated using the data collected from both Wave 1 and Wave 2 survey. Objective 2 has been achieved. The research team has highlighted policy interventions or practical implications based on the findings in every journal publication; thus, Objective 3 was fully achieved.

5.4 Summary of objectives addressed to date

Objectives <i>(as per 5.1/5.2 above)</i>	Addressed <i>(please tick)</i>	Percentage Achieved <i>(please estimate)</i>
1. To investigate the role of place attachment in explaining recycling behavior	✓	100%
2. To examine the mechanisms of recycling behaviors' spillover effect on other pro-environmental behavior	✓	100%
3. To draw policy implications and suggest necessary measures in stimulating recycling behavior and positive spillover behaviors	✓	100%

6. Research Outcome

6.1 Major findings and research outcome

(Maximum 1 page; please make reference to Part C where necessary)

The role of place-based psychological meanings in decision-making processes of engaging in recycling behavior has been studied (Part C: Journal Publication 1 & 2). By utilizing the extended theory of planned behavior (TPB), we found that impact of place attachment on recycling intention is primarily indirect (Part C: Journal Publication 1); the effect is significantly mediated by the TPB constructs: attitude, moral norm, and awareness of consequences. Moreover, the indirect effect of place attachment via awareness of consequences is the strongest among the three statistically significant

mediated paths. Findings not only reveal that the extended TPB is a useful framework for conceptualizing the causal effect of place attachment on recycling intention, but also shed new light on the role of place-based psychological meanings that contributes to decision-making processes of taking environmental behaviors. Practically, the findings would be useful for designing effective policy interventions to promote environmentally responsible behaviors by drawing reference to place-based psychological meanings.

The research team have also assessed effect of place attachment sub-dimensions on recycling behavior. Specifically, the indirect effect of place dependence and moderating influence of place identity on recycling intention in the framework of extended theory of planned behavior (TPB) was investigated (Part C: Journal Publication 2). We found that place dependence is highly associated with place identity while place identity is a significant predictor of recycling intention. Statistical results indicated that place identity fully mediates the impact of place dependence on recycling intention. In other words, place dependence has an indirect influence on recycling intention. Besides, place identity significantly moderates instrumental attitude and perceived behavioral control; however, the relationship between experiential attitude and recycling intention is not contingent on place identity. The findings give insights into the relationships among place attachment sub-dimensions and how these relationships would contribute to the prediction of pro-environmental behaviors. Findings add value to the understanding of when do the TPB constructs encourage or discourage pro-environmental intention and behavior.

The mechanisms of spillover effects of pro-environmental behavior were investigated (Part C: Journal Publication 3). We found that environmental self-efficacy successfully mediates the relationship between initial behavior (e.g., recycling) and subsequent pro-environmental behaviors (namely, curtailment & conservation behavior, waste reduction & green purchasing behavior, and civic & high effort environmental behavior). Environmental self-efficacy partially mediates two paths: 1) recycling → curtailment & conservation behavior and 2) recycling → waste reduction & green purchasing behavior; but it fully mediates recycling effect on civic & high effort environmental behavior. We found that such kind of mediation is further contingent on the levels of environmental self-identity, that is, the extent to which we consider ourselves as a type of person who acts environmentally-friendly positively determines the magnitude of environmental self-efficacy mediated spillover effects between pro-environmental behaviors. Previous studies have separately highlighted the role of environmental self-identity and self-efficacy for initiating spillover effects across environmental behavior (e.g., Van Der Werff & Steg, 2018; Lauren et al., 2017). This research has uncovered the moderated mediation mechanism by environmental self-identity and self-efficacy in explaining the phenomenon of positive spillover across different types of pro-environmental behavior.

6.2 Potential for further development of the research and the proposed course of action *(Maximum half a page)*

Despite the enthusiasm of investigating mechanisms of positive and/or negative behavioral spillover effects by existing environmental literature, not many studies have focused on how to reinforce positive spillover effect while prevent the negative one. Exploring what makes positive spillover effect to be more stable and stronger is equally as important as studying the mechanisms of initiating behavioral spillover effects. It is because findings might contribute to the internalization and maximization of positive behavioral spillover effects. Although this research project has proposed and found that environmental self-identity as a moderator strengthening environmental self-efficacy mediated positive spillover effect across environmental behaviors, there should be other factors that serve as moderators as well as different mechanisms reinforcing positive

spillover effect or preventing negative spillover behavior. Therefore, the shift of research direction merits a consideration. Future studies may devote more space for moderators of behavioral spillover effects by introducing qualitative research component to the project. To gain comprehensive understanding of the issue, objectively-measured behavior instead of self-reported behavior is also suggested.

7. Layman's Summary

(Describe in layman's language the nature, significance and value of the research project, in no more than 200 words)

This research project investigates two concepts – place attachment and behavioral spillover effects, which have been gaining increasing attention from the field of pro-environmental studies. It aims to study the role place attachment plays in predicting recycling behavior and examine the mechanism of spillover effects across pro-environmental behaviors. Significance of this research project lies in the use of the extended theory of planned behavior (TPB) to conceptualize and comprehend effect of place-based psychological meanings in predicting pro-environmental behaviors. Besides, this is the first study which discovers that environmental self-identity strengthens environmental self-efficacy mediated spillover effects between different pro-environmental behaviors, a mechanism that encourages the uptake of behaviors that will have greater environmental benefits. Findings of this project will redound to environmental protection considering that place attachment is one of the important social-psychological factors that predicts pro-environmental behaviors. By drawing reference to the findings of place attachment, policymakers will be able to design more accurate environmental policy interventions. The reveal of complex relationships between environmental self-identity and environmental self-efficacy offers practical suggestions for encouraging more pro-environmental behaviors; for example, reinforcing positive spillover environmental behaviors which are mediated by environmental self-efficacy by emphasizing the role of environmental self-identity.

Part C: Research Output**8. Peer-Reviewed Journal Publication(s) Arising Directly From This Research Project**

(Please attach a copy of the publication and/or the letter of acceptance if not yet submitted in the previous progress report(s). All listed publications must acknowledge RGC's funding support by quoting the specific grant reference.)

The Latest Status of Publications				Author(s) (denote the corresponding author with an asterisk*)	Title and Journal / Book (with the volume, pages and other necessary publishing details specified)	Submitted to RGC (indicate the year ending of the relevant progress report)	Attached to this Report (Yes or No)	Acknowledged the Support of RGC (Yes or No)	Accessible from the Institutional Repository (Yes or No)
Year of Publication	Year of Acceptance (For paper accepted but not yet published)	Under Review	Under Preparation (optional)						
2021				Calvin Wan*, Geoffrey Qiping Shen, Stella Choi	The place-based approach to recycling intention: Integrating place attachment into the extended theory of planned behavior / <i>Resources, Conservation, & Recycling</i> , 169, 105549.	No	Yes (Annex 1)	Yes	Yes
		✓ (Invited for revision)		Calvin Wan*, Geoffrey Qiping Shen, Stella Choi	Pathways of Place Dependence and Place Identity Influencing Recycling in the Extended Theory of Planned Behavior / <i>Journal of Environmental Psychology</i> (Manuscript ID: J EVP-D-21-00611)	No	Yes (Annex 2)	Yes	No

The Latest Status of Publications				Author(s) (denote the corresponding author with an asterisk*)	Title and Journal / Book (with the volume, pages and other necessary publishing details specified)	Submitted to RGC (indicate the year ending of the relevant progress report)	Attached to this Report (Yes or No)	Acknowledged the Support of RGC (Yes or No)	Accessible from the Institutional Repository (Yes or No)
Year of Publication	Year of Acceptance (For paper accepted but not yet published)	Under Review	Under Preparation (optional)						
		✓ (Invited for revision)		Calvin Wan*, Geoffrey Qiping Shen, Stella Choi	Environmental self-efficacy mediates spillover between pro-environmental behaviors: The conditional effect of environmental self-identity / <i>Journal of Business Research</i> (Manuscript ID: JOBR-D-21-03874)	No	Yes (Annex 3)	Yes	No

9. Recognized International Conference(s) In Which Paper(s) Related To This Research Project Was / Were Delivered

(Please attach a copy of each conference abstract)

Month / Year / Place	Title	Conference Name	Submitted to RGC (indicate the year ending of the relevant progress report)	Attached to this Report (Yes or No)	Acknowledged the Support of RGC (Yes or No)	Accessible from the Institutional Repository (Yes or No)
N/A	N/A	N/A	N/A	N/A	N/A	N/A

10. Whether Research Experience And New Knowledge Has Been Transferred / Has Contributed To Teaching And Learning

(Please elaborate)

Research methodology, research design (i.e., longitudinal), data analytical skills (e.g., PROCESS macro for SPSS, PLS-SEM for analyzing hierarchical component model), findings, and other research issues related to this project have been considered and could be used as examples for teaching purposes. Students would be benefited from the sharing of up-to-date knowledge and research practices of the study field.

11. Student(s) Trained*(Please attach a copy of the title page of the thesis)*

Name	Degree Registered for	Date of Registration	Date of Thesis Submission / Graduation
N/A	N/A	N/A	N/A

12. Other Impact*(e.g. award of patents or prizes, collaboration with other research institutions, technology transfer, teaching enhancement, etc.)*

Teaching was enhanced by incorporating the research methodology and techniques in this project to the teaching materials of a research subject in our institution. The knowledge and findings of recycling behaviours and spillover effect were also used to update the subject materials for a subject on environmental psychology. Students would be able to learn the most updated knowledge on research methods as well as environmental problems.

13. Statistics on Research Outputs

	Peer-reviewed Journal Publications	Conference Papers	Scholarly Books, Monographs and Chapters	Patents Awarded	Other Research Outputs (please specify)	
No. of outputs arising directly from this research project	3	0	0	0	Type	No.
					0	0

14. Public Access Of Completion Report*(Please specify the information, if any, that cannot be provided for public access and give the reasons.)*

Information that Cannot Be Provided for Public Access	Reasons
N/A	N/A