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Travel Confidence Reviving Tourism Industry: Is the Vaccination a Solution?

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Abstract: Vaccination can play a decisive role in reducing travel risk and rebuilding travel confidence. Previous studies pointed out that travel desires moderate or influence vaccination intention, while this paper extends their studies to investigate the relationships between vaccine trust (VT), travel confidence after vaccination (TC), travel intention (TI) and travel behaviour (TB). The VT, TC, and TI clusters were insignificant towards travel behaviour, indicating that travel confidence triggers travel intention but did not reflect on behaviour. The binomial logit model disclosed that only travel confidence was statistically significant toward travel intention, whereby tourists who were more desirous of travelling would be 5.3 times greater in the high-TC cluster. This paper suggests that vaccination should not serve as the only solution for the early stage of tourism reboot, as vaccination can boost travel confidence but not the tourists' behaviour.

Keywords: vaccination; travel confident; travel intention; travel behaviour; restart tourism

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1. Introduction

The vaccination rate is one of the critical determinants of border reopening for tourism [1–3]. Many studies focused on factors affecting vaccination intention, such as perceived risk [4], travel concerns [5–7], and travel desires [8–10]. However, the relationship between vaccine trust, travel confidence, travel intention, and travel behaviour has yet to be studied. Previous studies focused on the vaccine uptake intention [8–10] and travel intention [8,11]. Little is known about travel behaviour (whether vaccinated people are more willing to travel for leisure). Hence, this research aims to fill the gap regarding whether vaccination is the solution to boost the travel confidence, which will ultimately help in reviving the tourism industry.

Rebooting tourism relies heavily on the number of the population immunized against the coronavirus through vaccination programs. Therefore, understanding travel confidence after vaccination and travel behaviour is critical for tourism revitalization. That the axiom of vaccination can have significant impacts on the willingness to travel and the recovery of the hospitality and tourism industry is commonly assumed in the literature (e.g., [7,10,11]), but it has yet to be tested. There is less evidence to prove that vaccine trust will result in higher travel confidence, not to mention the effects of vaccination and travel confidence reflected on tourist behaviour. Most of the research investigated the relationship between vaccination and travel intention [8–11]. On 24 February 2021, Malaysia started to administer COVID-19 vaccines, better known as the COVID-19 immunization program [12]. According to Ministry of Health Malaysia (2022) [13], Malaysia has administered at least 70,274,130 doses of COVID-19 vaccines so far, covering 81.7% of the population by the date of 30 April 2022. Furthermore, Malaysia has lifted interstate and international travel restrictions for fully vaccinated people since 10 October 2021, opening its border for the entry of international travellers on 1 April 2022 [14].

Research on behaviour theory and its relationship with the aforementioned axiom is lacking in the tourism literature in general [15]. This paper focuses on variables such as vaccine trust (VT), travel confidence after vaccination (TC), travel intention (TI), and travel behaviour (TB) (travel or not after vaccination). The confirmation of the relationships among the variables of VT, TC, TI, and TB could provide a better understanding of an emerging phenomenon: vaccination as a solution to revive tourism. This paper will give tourism practitioners a new insight into the benefits of vaccination in terms of reviving the tourism industry in the midst of the COVID-19 pandemic. The findings can be influential to future research, as it is an unprecedented study that was conducted in the early stage of interstate and border opening. This research offers new perspectives on the effectiveness of vaccination in tourism revitalization as presented in travellers' behaviour.

2. Vaccination in Tourism

In the literature, vaccination is not a new subject, as international travel often comes with the risk of disease [16]. Travelling involves the risk of exposure to different diseases, and the differences in environmental conditions at the unfamiliar destination exacerbate the situation (i.e., weather, food, water supply, hygiene level) [5]. According to WHO (2007), there are three classes of vaccines available for travellers' health protection: (1) routine, (2) selective use, and (3) mandatory. Most routine vaccines administered in childhood require periodic booster doses to avoid infection, but individuals often neglect booster vaccination, especially if the risk of infection in their home country is low [17]. However, for travellers who travel to other countries, the risk of infection may be higher, and booster vaccination is needed [18]. The routine vaccines include BCG, hepatitis B, polio, DTP, Haemophilus, pneumococcus, rotavirus, measles, rubella, and HPV [19]. Selected shots are advised for travellers based on the travel risk assessment [17]. This depends on the location of travel [20]. The mandatory vaccines are administered by the International Health Regulations; e.g., yellow fever vaccination is prescribed for two main reasons: first, to protect travellers in areas where there is a risk of infection and, second, to prevent the occurrence of imported infection cases from endemic countries [17]. The COVID-19 vaccine, in some countries, is classified as a mandatory vaccine for border entry [21].

3. Underlying Theories and Hypotheses Development (VT, TC, TI, TB)

The transtheoretical model (TTM) was developed by Prochaska and Velicer (1997) [22] in the 1970s and asserts that changes in health behaviours involve progression. There are six stages of the model applicable to describe the progression of COVID-19 vaccine uptake: (1) pre-contemplation (no intention of taking action), i.e., in the early period, people have no intention to receive the vaccine; (2) contemplation (change of thought is happening rapidly by weighing the pros and cons), i.e., considering the uptake of the vaccine; (3) preparation (ready to take action), i.e., registering in MySejahtera app (Malaysian contact tracing app) for vaccination; (4) actions (actions taken with a view to change), i.e., vaccine uptake; (5) maintenance (experience of some obvious changes in health since the action of vaccine takes place and continues), i.e., second and third dose of vaccine uptake; (6) termination (completion of behavioural changing process), i.e., resuming normal life and tourism recovery. Most previous studies focus on vaccination intention [8,9]; however, only a handful of studies have touched on vaccine trust and travel confidence [23]. The TTM can also explain the travel behaviour context, whereby the pre-contemplation stage involves people who are not planning to travel for leisure after vaccination (travel behaviour for those who never travelled after vaccination). In the contemplation stage, people may start to consider travelling for leisure, hence starting to weigh on the vaccine trust and travel constraints (vaccine and travel confidence). The preparation stage involves planning a trip (travel intention), followed by the action stage (travel behaviour for those who travelled after vaccination). The maintenance stage is about keeping the travel behaviour after vaccination, and the last stage is the termination stage in which people return to normal (pre-pandemic or free to travel). The first four stages of TTM were applied in this research.

Protection motivation theory (PMT) was developed to understand how people are motivated to defend themselves in the face of a perceived health threat [24,25]. PMT suggests two processes: threat appraisal and coping appraisal to predict the protection motivation, and this is reflected in people's intention to perform a recommended protective health behaviour [26]. Threat appraisal refers to perceptions of vulnerability and the severity of a disease, and coping strategies indicate the perception of response efficacy (the belief that the behaviour undertaken will reduce the health threat) and self-efficacy (that the belief in the behaviour undertaken can be successfully performed) [27]. This theory has been widely adopted in the health tourism literature [23,27,28]. Williams et al. (2022) [23] employed PMT, vaccine trust, misinformation, and social media usage to examine Italian perceptions of voluntary health behaviour toward the COVID-19 vaccination and their interest in tourism activities. The researchers classified two clusters, namely high and low vaccine trust, and surprisingly found that many tourism workers tend to have lower vaccine trust. Moya Calderón et al. (2021) [29] found that although PMT was originally designed to address the health threat, it is also applicable to the current context of vaccine trust and travel (both are strategies for coping with the health threat). Thus, the following hypothesis is proposed:

H1. *Increased vaccine trust results in increased confidence in travel.*

Psychological and behaviour theory was used to understand health-related behaviour. In year 1950, the health belief model (HBM) was developed by Hochbaum et al. (1952) [30] to study the factors of low turnout rates for free and convenient tuberculosis screening. This model is a cognitive model with a greater focus on mental processes and behavioural changes in individuals [31]. The foundation of HBM was based on two main elements, namely the desire to avoid the disease and to take measures for recovery if ill. The claim that a particular sanitary action will prevent or cure the disease is a model that has been widely used in the vaccination literature [15,32,33] as well as in the tourism context [15,32]. There are six constructs of the HBM: perceived susceptibility, i.e., self-evaluation of the chances of contracting a disease or condition; perceived severity, i.e., self-judgment of the severity of the disease or condition; perceived benefits, i.e., the chances of which better outcomes will result in response to the action; perceived barriers, i.e., what will stop one from taking the new action; cues to action, i.e., the push factors (external influence) to take action; and self-efficacy, i.e., the belief of one's own ability to act. These were the main variables in vaccine uptake, but in the present study, these variables were used to develop the concept of vaccine trust.

HBM was employed by Suess et al. (2022) [15] to examine factors affecting pre-travel behaviour, particularly travel confidence, and it has suggested that federal and international authorities should impose mandatory vaccination, both domestic and international, to ensure vaccine coverage throughout the population. If this is not done, residents at the destination will be more antagonistic towards visitors. As a result, many prior studies outline the need of vaccination passports for travellers [34,35].

Apart from the conventional theories, the recent study performed by Adongo et al. (2021) [5] proposed a comprehensive travel vaccination concerns scale for measuring travellers' concerns about vaccination for international travel. Six concerns were identified: safety, efficacy, cost, time, access, and autonomy, with all of them affecting vaccine trust. Safety and efficacy are the most common concerns in the prior literature [36–38]. This is due to the uncertainty of the vaccination impact as well as mistrust of vaccines for reasons such as conspiracies [4], politics [4,39], economics [23], and religion [40]. Time and cost concerns are regarded as perceived loss of time and money in accessing the COVID-19 vaccine [5]; however, both concerns are not designed to improve the confidence level but the perceived cost. Additionally, Malaysia provides a free vaccination program to the residents regardless of citizenship. Therefore, time and cost are not applicable to the current study. Access concern means the availability of vaccine information (awareness) [5]. This is one of the key factors that increases the confidence level in vaccine and vaccination intention [39]. The last concern is autonomy, which is associated with travel vaccination policies. Malaysia has yet to make the COVID-19 vaccination mandatory [41]. Hence, this autonomy concern is excluded in examining the VT. Thus, the second and third hypotheses are suggested as given below:

H2. *Increased vaccine trust leads to travel intention.*

H3. *Increased confidence in travel drives travel intention.*

There is are relatively fewer studies exploring the vaccination trust and travel intention (TI) [11,42] and almost no research examining travel behaviour (TB). The study of Gursoy et al. (2021) [11] was conducted at the early stage of the vaccination process, and findings disclosed that vaccination intention negatively affects travel intentions. The study indicated that people who are willing to get the vaccine would be more likely to postpone their travel plans, while those who are unwilling to get the vaccine would not change their travel plans when the travel restrictions are lifted. This makes sense, as at the early stage, people perceived travelling-associated health risks as a result of a low vaccination rate, while in the long term, an increased vaccination rate may lower the perceived health risk associated with travelling. Research done by Morar et al. (2022) [42] at the later stage revealed that vaccination intention is positively influencing the intention of travelling, and younger people are more inclined to vaccinate against COVID-19 if the vaccines allow them to travel. The majority of respondents (82%) were likely to be vaccinated if the vaccine would ease travelling [42], and this was also found in studies from the UK [43], Turkey [44], and Romania [45]. Previous studies focused on vaccine intention, but at this point (over a year of executing the immunization program), they are outdated, as most people have been vaccinated. As a result, this study includes the hypotheses below:

H4. *Increased confidence in vaccinations results in travel behaviour.*

H5. *Increased confidence in travel drives travel behaviours.*

4. Methodology

The purpose of this study was to examine whether vaccine trust is interrelated with travel confidence and whether it is reflected in travel intention and ultimately turns into action. The survey instrument consists of five sections: demographic, vaccine trust (VT), travel confidence (TC), travel intention (TI), and travel behaviour (TB). The first section includes demographic characteristics such as gender, age, and education. Some travel concerns from Adongo et al. (2021) [5] and trust in vaccination measures by Larson et al. (2018) [46] were adopted to develop the measurement scale of VT. Seven dichotomous questions were used to measure VT, which is presented in Table 1. TC measurement items were developed based on the travel-related measure [42,47] and confidence in transport travel [48,49] on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Three measurement items of TI employed in other studies were also used in this study [50]. Last but not least, TB was measured by one item: "I have never travelled for leisure after vaccination". Dichotomous questions (Yes or No) for both TI and TB items were listed.

The questionnaire was created in English and translated into Mandarin and Malay by two professional translators and went through the final check by two authors. Three experts checked, and a pilot study with 40 respondents was conducted to assure the comprehensibility of the questions, and no concern was reported. A cross-sectional, anonymous, online survey (Google form) was carried out among residents in Malaysia for over two months, which was from mid-February to mid-April 2022. Around 80% of Malaysian residents were vaccinated and have had the freedom to travel for leisure from 10 October 2021 [14]. A convenience sample and snowballing strategy was employed. The data were collected online through a snowball sampling technique, which is commonly used to locate the hidden population [51], particularly during a COVID-19 pandemic. Though this approach limits non-random selection procedures, correlations between a group of respondents and selection probabilities rely on the subjective judgments of respondents and have confidentiality concerns [51,52]. However, it enables us to cope with the financial, time-related, and situational constructs (social distancing rule, movement restriction, and the risk of disease infection). Two questions were asked in the Google form before the start of the survey: "Are you a resident in Malaysia?" and "Are you a vaccine recipient?**"**. The Google form link was emailed and shared to the public, and participants who were willing to complete the questionnaire were asked to share it with their friends and families. A total of 395 completed questionnaires were collected, but 17 of them were eliminated because the respondents had yet been unvaccinated (4.3%). Hence, 378 respondents were used for data analysis.

Table 1. Measurement Items.

Variables	**Label**
Vaccine Trust	
COVID-19 vaccine helps to prevent me from getting COVID-19.	VT1
COVID-19 vaccine will be harmful to my health? (reversed).	VT2
I know someone ever had a bad reaction to a vaccine, which made me reconsider to get vaccinated (reversed).	VT3
I believe that there are other better ways to prevent diseases instead of vaccine (reversed).	VT4
I am fully aware of the information about vaccines and their safety that I am receiving.	VT5
Some vaccines are more effective than the one introduced by the government (reversed).	VT6
Self-vaccination helps to protect other people from being infected with COVID-19 disease.	VT7
Travel confidence	
After receiving a complete vaccine, I feel more confident to travel.	TC1
During traveling, the risk of being infected with the COVID-19 disease is low after vaccination.	TC2
I can accept the new norms that have been imposed when it comes to traveling.	TC3
The reopening of the tourism sector is a thoughtful idea due to the high vaccination rate.	TC4
After vaccination, it is necessary to follow the SOPs that have been set when traveling. (reversed)	TC5
For children under the age of 18 and have not received the vaccine are no allowed to travel.	TC6
After vaccination, COVID-19 travel insurance is not a necessary during a trip.	TC7
I am concerned about the vaccination rates of workers who are working in the tourism industry.	TC8
Travel Intention	
I plan to travel somewhere after vaccination.	TI1
I plan to travel within Malaysia after vaccination.	TI2
I plan to travel aboard after vaccination.	TI3
Travel Behaviour	
I have never travelled for leisure after vaccination (reversed).	TB

Descriptive K-mean cluster, chi-square, and binary logistic analyses were implemented using SPSS 28.0. Non-hierarchical cluster analysis, i.e., K-mean cluster, was performed to identify cluster memberships: high or low (vaccine trust, travel confidence) and desired or undesired (travel intention). Raw data were directly analysed instead of using the factor score because the execution of factor analysis before the cluster analysis could lead to the loss of information, which may affect the final result [23,53]. The measurement items of each cluster were subsequently produced and compared using cross-tabulation (i.e., chi-square) and the logit model. To further differentiate and compare among the clusters, the chi-square test and logit regression were performed four times among the constructs to measure both high (1) or low (0) vaccine trust and travel confidence as well as desire (1) or undesired (0) of travel intention and yes (1) or no (0) to travel for leisure after vaccination.

The chi-square test was first analysed to explore the single-dimensional relationship between clusters 1 and 0 of vaccine trust, travel confidence, travel intention, and travel behaviour with respect to the demographic and among the items from other constructs. The second stage was to use the binomial logit model to examine the intra-cluster [54]. McFadden's model relies on the assumption that the high confidence was a non-random function; V_1 or V_0 of the independent variables plus a random error ε term is as follows:

$$T\ (\text{High} = 1) = V_1 + \varepsilon_1 \quad \text{or} \quad T\ (\text{High} = 0) = V_0 + \varepsilon_0 \tag{1}$$

The correlation among the cluster and the items was identified with an assumption that one more likely to travel for leisure relates more to the high-confident cluster if and only if:

$$T\ (\text{High} = 1) > T\ (\text{Low} = 0) \quad \text{or} \quad V_1 - V_0 > \varepsilon_0 - \varepsilon_1$$

Accordingly, regarding to travel behaviour, we assume that the individual n's utility function U_n of the travel behaviour can be expressed as follows [55]:

$$U_n = \beta_{n0} + \sum_{a=1}^{A} \beta_{na,VC} \cdot VT_{n,a} + \sum_{b=1}^{B} \beta_{nb,TC} \cdot TC_{n,b} + \sum_{c=1}^{C} \beta_{nc,TI} \cdot TI_{n,c} + \varepsilon_n$$

where $VT_{n,a}$ represents a number A of vaccine trust for individual n; $TC_{n,b}$ a series of B travel confidence; $TI_{n,c}$ is a number C of travel intention; and the parameters $\beta_{na,VT}$, $\beta_{nb,TC}$, and $\beta_{nc,TI}$ calculate the impacts of these variables on the utility of yes or no in travel behaviour. Finally, the error term of ε_n follows an extreme value distribution. The probability of the travel behaviour P_n is expressed as follows:

$$P_n = \int \frac{exp\ \left\{ \beta_{n0} + \sum_{a=1}^{A} \beta_{na,VT} \cdot VT_{n,a} + \sum_{b=1}^{B} \beta_{nb,TC} \cdot TC_{n,b} + \sum_{c=1}^{C} \beta_{nc,TI} \cdot TI_{n,c} \right\}}{1 + exp\ \left\{ \beta_{n0} + \sum_{a=1}^{A} \beta_{na,VT} \cdot VT_{n,a} + \sum_{b=1}^{B} \beta_{nb,TC} \cdot TC_{n,b} + \sum_{c=1}^{C} \beta_{nc,TI} \cdot TI_{n,c} \right\}} \\ \text{ø}(\beta_n | b, W) d\beta_n \tag{1}$$

where represents the density function of parameters β_n, with mean b and variance W. The main advantage of a random parameter logit model is that it captures the heterogeneity in the sample and assumes that the parameters are random variables [56]. Finally, the Hosmer–Lemeshow test was executed to ensure the goodness of fit. In addition, the parameter β_n was estimated by the maximum likelihood; therefore, the likelihood ratio index was used to confirm the model equation goodness of fit as follows:

$$1 - \frac{L_{UR}}{L_R}$$

where L_{UR} is the unrestricted vector of the log-likelihood function at the maximum likelihood estimate of the parameters β_n, and L_R is the likelihood function when all the parameters β_n are restricted to zero [57].

5. Results

The raw data of VT, TC, and TI were used in clustering. The K-mean clustering resulted in "High VT" (N = 243) and "Low VT" (N = 135), "High TC" (N = 292) and "Low TC" (N = 86), and "desire to travel" (N = 290) and "undesired to travel" (N = 88). As presented in Table 2, the final cluster centres were shown, and all items were significant in the cluster with p-value < 0.05. Some items were outliers in the cluster, for instance, the VT 4, "I believe that there are other better ways to prevent diseases instead of vaccine (reversed)", high cluster was 0.8 larger than 0.57, and the TI 3, "I plan to travel aboard after vaccination", desire to travel was 0.66 smaller than 0.81. This indicates that the respondents in the undesired cluster inclined to travel abroad. With caution, we remind that questions for measuring VT and TI are categorical data (binary—YES or NO), and data for TC range on the Likert scale. TB was also manually clustered into "Yes—have travelled" (N = 149) and "No (i.e., never travel)" (N = 229), as it was measured by only one item: "I have never travelled for leisure after vaccination (reversed)".

Table 2. Results of Cluster Analysis.

Items	Final Cluster Centres		ANOVA	
VT CLUSTER	**High N:243**	**Low N:135**	**F**	**Sig (*p*-Value)**
VT1	0.89	0.45	108.513	<0.001
VT2	0.80	0.90	6.653	0.010
VT3	0.61	0.82	19.110	<0.001
VT4 *	0.80	0.57	24.551	<0.001
VT5	0.93	0.67	47.020	<0.001
VT6	0.53	0.82	35.474	<0.001
VT7	0.87	0.51	67.679	<0.001
TCCLUSTER	**High N:292**	**Low N:86**	**F**	**Sig (*p*-value)**
TC1	4.17	2.49	225.621	<0.001
TC2	4.13	2.58	158.511	<0.001
TC3	4.36	3.37	78.780	<0.001
TC4	4.15	2.59	188.569	<0.001
TC5	3.91	4.24	4.463	0.035
TC6	2.86	1.97	33.485	<0.001
TC7	4.62	4.13	24.903	<0.001
TC8	4.52	4.08	18.436	<0.001
TICLUSTER	**Desire N:290**	**Undesired N:88**	**F**	**Sig (*p*-value)**
TI1	0.85	0.13	289.876	<0.001
TI2	0.97	0.61	108.337	<0.001
TI3 *	0.66	0.81	6.767	0.010
TBCLUSTER	**YES**	**NO**	**NA**	**NA**
TB	149	229	NA	NA

* NA = No Applicable.

The difference between the two clusters was also determined using the chi-square test (Table 3). Only gender among three demographic data was statistically significant and associated with VT, whereby more females (N = 169) were in the high-VT cluster (X^2 = 7.43, p = 0.01). Relationships were found between VT and TC (X^2 = 6.94, p = 0.01), VT and TI 1 (X^2 = 6.60, p = 0.01) and 3 (X^2 = 10.56, p = 0.00), TC and TI (X^2 = 37.09, p = 0.00), as well as TB associated with VT 1 (X^2 = 4.39, p = 0.04) and TC 2 (X^2 = 11.28, p = 0.02) and 4 (X^2 = 10.58, p = 0.03), 7 (X^2 = 14.51, p = 0.01) and 8 (X^2 = 11.89, p = 0.02). Due to the relative weakness of the chi-square test, the binary logistic model was employed as a more understandable technique for this research.

The coefficient β_n of Equation (1), the two-tailed p-value, and OR (odds ratio or exponential of the coefficient) are presented in Table 4. According to Abachnick and Fidell (2019) [58], the odds ratio is a number that explains the increase if ratio >1, decrease if ratio <1, and odds of being in one outcome category when the value of the predictor increases by one unit. In assessing the model fitness, two statistical tests are presented in Table 4, and the Hosman–Lemeshow statistic of overall fitness indicated that there was no significant difference between the actual and predicted classifications [57,59] where the p-value > 0.05 (0.46 in this case). The likelihood ratio index measure of the goodness of fit of the estimated equation 1 was 0.07 (near to zero). As a result, these two statistics provided good support for the logit model.

Table 3. Chi-square Test for Clusters.

Items	Total (N:378)		VT		TC		TI		TB	
			Chi-Square	p-Value	Chi-Square	p-Value	Chi-Square	p-Value	Chi-Square	p-Value
	N/Mean	(%/SD)	X^2		X^2		X^2		X^2	
			High (N)	**Low (N)**	**High (N)**	**Low (N)**	**Desire (N)**	**Undesired (N)**	**Yes (N)**	**No (N)**
					Demographic					
Gender			***7.425***	***0.01 ******	***0.812***	***0.37***	***0.002***	***0.96***	***0.490***	***0.48***
Female	244	64.6	169	75	192	52	187	57	93	151
Male	134	35.4	74	60	100	34	103	31	56	78
Age			***4.245***	***0.12***	***0.149***	***0.93***	***1.748***	***0.42***	***1.980***	***0.37***
18–34	267	70.6	177	90	206	61	209	58	100	167
35–49	57	15.1	38	19	45	12	40	17	27	30
>50	54	14.3	28	26	41	13	41	13	22	32
Education			***2.357***	***0.31***	***0.750***	***0.69***	***0.886***	***0.64***	***0.669***	***0.72***
1st and 2nd school	75	19.8	44	31	58	17	57	18	32	43
Undergraduate	225	59.5	144	81	171	54	176	49	85	140
Postgraduate	78	20.6	55	23	63	15	57	21	32	46
Vaccination confidence					6.936	0.01 ***	***0.159***	***0.69***	***1.863***	***0.17***
VT1 (yes)	277	73.3			17.346	0.00 ***	*5.449*	*0.02 ***	4.394	0.04 **
VT2 (yes)	317	83.9			1.890	0.17	*5.059*	*0.02 ***	0.000	0.99
VT3 (yes)	259	68.5			3.347	0.07 *	*5.934*	*0.02 ***	0.042	0.84
VT4 (yes)	272	72.0			0.620	0.43	*2.934*	*0.09 **	2.526	0.11
VT5 (yes)	317	83.9			0.140	0.71	*3.680*	*0.06 **	2.083	0.15
VT6 (yes)	239	63.2			2.841	0.09 *	*1.372*	*0.24*	0.491	0.48
VT7 (yes)	280	74.1			2.550	0.11	*5.167*	*0.02 ***	0.399	0.53
Travel confidence after vaccination			***6.936***	***0.01 ******			***37.092***	***0.00 ******	***0.278***	***0.60***
TC1	3.79	1.151	*8.849*	*0.07 **			*86.405*	*0.00 ****	11.280	0.02 **
TC2	3.78	1.194	*18.128*	*0.00 ****			*23.889*	*0.00 ****	6.426	0.17
TC3	4.13	0.993	*9.618*	*0.05 ***			*11.989*	*0.02 ***	2.814	0.59
TC4	3.80	1.134	*10.563*	*0.03 ***			*22.594*	*0.00 ****	10.584	0.03 **
TC5	3.99	1.278	*2.817*	*0.59*			*7.294*	*0.12*	4.157	0.39
TC6	2.66	1.318	*3.314*	*0.51*			*6.263*	*0.18*	1.437	0.84
TC7	4.51	0.834	*4.708*	*0.32*			*6.652*	*0.16*	14.509	0.01 ***
TC8	4.42	0.853	*2.172*	*0.70*			*8.241*	*0.08 **	11.888	0.02 **
Travel Intention			***0.159***	***0.69***	***37.092***	***0.00 ******			***2.774***	***0.10 ****
TI1 (yes)	258	68.3	*6.603*	*0.01 ****	69.802	0.00 ***			3.524	0.06 *
TI2 (yes)	335	88.6	*0.047*	*0.83*	0.734	0.39			0.956	0.33
TI3 (yes)	263	69.6	*10.561*	*0.00 ****	11.717	0.00 ***			0.006	0.94
TB(yes)	149	39.4	**1.863**	**0.17**	**0.278**	**0.60**	**2.774**	**0.10 ***		

Note: *** = significance level of $p \leq 0.01$, ** = significance level of $p \leq 0.05$, and * = significance level of $p \leq 0.1$.

Table 4. Results of Binary logistic regression.

	VT			***TC***			***TI***			***TB***		
Items	β_n	***Sig***	***OR***	β_n	***Sig***	***OR***	β_n	***Sig***	***OR***	β_n	***Sig***	***OR***
Vaccination confidence				***0.665***	***0.21***	***1.944***	***−0.671***	***0.22***	0.511	***−0.464***	***0.28***	***0.629***
VT1 (yes)				0.538	0.16	1.712	0.119	0.78	1.127	0.790	0.02 **	2.204
VT2 (yes)				0.248	0.59	1.282	−0.416	0.38	.660	−0.097	0.80	0.908
VT3 (yes)				0.331	0.35	1.393	0.193	0.59	1.213	−0.101	0.73	0.904
VT4 (yes)				−0.383	0.30	0.682	0.326	0.39	1.385	0.568	0.07 *	1.765
VT5 (yes)				−0.345	0.44	0.708	0.707	0.10 *	2.028	0.552	0.14	1.738
VT6 (yes)				−0.176	0.60	0.839	0.535	0.11	1.708	−0.281	0.28	0.755
VT7 (yes)				−0.453	0.23	0.636	0.415	0.28	1.514	0.278	0.38	1.320
Travel confidence after vaccination	***0.115***	***0.77***	***1.122***				***0.515***	***0.28***	***1.673***	***−0.021***	***0.96***	***0.979***
TC1	0.056	0.71	1.058				1.013	0.00 ***	2.753	0.167	0.28	1.182
TC2	0.338	0.00 ***	1.402				0.036	0.82	1.037	−0.278	0.03 **	0.757
TC3	0.132	0.33	1.142				−0.098	0.57	0.906	−0.038	0.79	0.963
TC4	0.053	0.68	1.054				−0.119	0.47	0.887	0.052	0.69	1.053
TC5	0.083	0.36	1.086				0.065	0.59	1.067	−0.047	0.60	0.954
TC6	−0.113	0.22	0.893				−0.008	0.95	0.992	−0.036	0.70	0.965
TC7	0.026	0.87	1.026				0.113	0.55	1.120	−0.287	0.05 **	0.750
TC8	−0.427	0.01 ***	0.653				−0.175	0.39	0.839	−0.327	0.03 **	0.721
Travel Intention	***0.036***	***0.95***	***1.037***	***1.669***	***0.01 ******	***5.307***				***−0.053***	***0.92***	***0.949***
TI1 (yes)	−0.104	0.82	0.902	1.095	0.02 **	2.988				0.405	0.39	1.500
TI2 (yes)	−0.341	0.49	0.711	−1.363	0.02 **	0.256				0.296	0.56	1.344
TI3 (yes)	0.657	0.05 **	1.929	1.024	0.02 **	2.784				−0.175	0.62	0.840
TB (yes)	***0.317***	***0.19***	***1.373***	***−0.495***	***0.10 ****	***0.609***	***0.264***	***0.40***	***1.301***			
Constant	1.538	0.12	4.656	0.032	0.96	1.032	−2.96	0.02 **	0.052	−0.185	0.85	0.831
Omnibus tests of model (chi^2/df/sig.)	***34.765/14/0.00***			**86.05/13/0.00**			***94.424/18/0.00***			***38.664/21/0.01***		
Cox–Snell test (Log likelihood/R^2)	***457.963/0.12***			**316.358/0.32**			***315.814/0.33***			***468.295/0.13***		
Hosmer–Lemeshowtest(chi^2/df/sig.)	***7.744/8/0.46***			**5.844/8/0.67**			***12.197/0.14***			***1.902/8/0.98***		
Equation fit (LUR/LR (1-LUR/LR))	***457.963/492.728 (0.07)***			**316.358/405.408 (0.22)**			***315.814/410.238 (0.20)***			***468.295/506.959 (0.08)***		

Note: *** = significance level of $p \leq 0.01$, ** = significance level of $p \leq 0.05$, and * = significance level of $p \leq 0.1$.

Three measure items were found to be significant to the predictive ability of the VT, including TC 2 (p = 0.00, OR = 1.40), 8 (p = 0.01, OR = 0.65), and TI 3 (p = 0.05, OR = 1.93). This indicates that individuals who agreed that the risk of being infected with the COVID-19 disease is low after vaccination would have a 1.40 times greater chance of having high vaccine trusts. However, people who are more concerned about the vaccination rates of tourism workers were found, by odds ratio 0.65, more inclined to have low vaccine trust. Those who plan to travel abroad were 1.93 times more likely to have high vaccine trust compared to those who do not.

TI was revealed statistically significantly predictive towards the high and low clusters of TC, where the p-value of three TIs was 0.02, β_n for plans to travel somewhere abroad was positive with OR 2.99 and 2.78, whereas β_n for plans to travel domestic was negative (−1.36) with OR 0.26 (<1), signifying that one who plans to travel domestically is more likely to have low travel confidence. The TC has a positive impact on TI (β_n = 1.67, p = 0.01, OR = 5.31), suggesting that the high confidence in travel after vaccination would trigger their travel intention by about 5.31 times more compared to those with low TC. However, when we run logistic regression for clusters of TI as the dependent variable, only one item was found statistically significant: TRACONF 2, which represents perceived low risk after vaccination bringing impact on the desire to travel (β_n = 1.01, p = 0.00, OR = 2.75).

Four measurement items were reflected in TB: VT 1 (β_n = 0.79, p = 0.02, OR = 2.20), TC 2 (β_n = −0.28, p = 0.03, OR = 0.76), 7 (β_n = −0.29, p = 0.05, OR = 0.75), and 8 (β_n = −0.33, p = 0.03, OR = 0.72). Individuals who agreed that vaccination helps to prevent COVID-19 disease would take action to travel after vaccination, whereas TCs have other results where β_n is negative. After vaccination and perceived low risk of being infected, COVID-19 travel insurance is not a necessity, and those who are concerned about the vaccination rate of tourism workers at the destination were more likely not to travel. It was surprising to find that TI was statistically insignificant towards TB.

6. Discussion and Conclusions

Herd immunization against infectious disease is one of the methods that guarantees the revitalization of tourism worldwide. However, at the early stage of vaccination, whether it builds travellers' confidence and whether the confidence can be reflected in their travel behaviour remain uncertain. This study aims to fill this research gap by using the transtheoretical model to investigate vaccine trust, travel confidence after vaccination, travel intention, and finally, whether they can be converted into behaviour. This paper offers the community of tourism researchers, practitioners, and local policymakers, especially governments' tourism decisionmakers, an answer to the question, "Is vaccination a solution for rebooting tourism in the early stage?" as well as determine how contemplation (VT and TC) affects the stage of preparation (TI) and the difference between those who remain in the stage of pre-contemplation and those who take action (TB). The findings identified eight clusters (i.e., high and low VT, high and low TC, desired and undesired TI, yes or no TB) of Malaysian residents based on their COVID-19 vaccine trust level, travel confidence level, travel intention, and finally the decision of whether to travel for leisure after vaccination. These clusters were then used to test the proposed hypotheses and analyse the relationship and association among the five hypotheses (Tables 3 and 4). The results consolidate previous studies [23]. Particularly, in assessing the association of gender with vaccine trust, females have more vaccine trust compared to males. However, in other demographic data such as education and age, no significant link was identified with VT. Travel-related constructs such as TC, TI, and TB were not associated with the demographics.

The relationship between VT and TC was explored: the chi-square test confirmed their interrelated influence, while the logit model partially supported their relationship (H1). Travel confidence after vaccination was linked with vaccine trust, and "perceived low risk", "accept the new norm traveling", and "support tourism reopening with high vaccination rate" were found to have significant differences between the high and low VT clusters. The logit model extended the explanation on two measured items, where "perceived low risk" was positively affected by vaccine trust; in contrast, "concern about tourism workers' vaccination status of the destination" was associated with the low-VT cluster. Interestingly, "planning to travel abroad" was significantly associated with VT and TC, and the tendency to be in the high-VT and -TC cluster was confirmed by the logit model. These findings discovered that those with a "plan to travel domestically" were predicted as more likely to be in the cluster of low TC. This might be due to the fact that travellers were more familiar with domestic destinations than international destinations [60]. As a result, vaccination might contribute a small impact on domestic tourism but has a larger impact on outbound travelling.

Based on the chi-square test and the binary logistic analysis, it was observed that travel intention was not reflected in travellers' behaviour, and most of the respondents never travelled for leisure after being vaccinated although they did have the desire to travel. This was outlined by the prior literature on the attitude of vaccine hesitancy [61], which also appeared in this study as the wait and see approach for travelling. The chi-square test disclosed that four measured scales of VT and TC were found associated with TI, respectively. Thus, the findings have proven H2 and H3. It was worth noting that for VT, "vaccine prevents infection", "not harmful to health", "hesitancy in vaccine due to bad reaction", and "self-vaccination protects others from being infected" were associated with travel intention. In addition, for TC, "confidence to travel after vaccination", "perceived low risk", "accepting now the norm of travelling", and "tourism reopening with high vaccination rate" were also interrelated with travel intention. However, there was a single construct: confidence to travel after vaccinated positively influenced travel intention, while other factors were insignificant in the logistic model. Through the analyses, we noticed that there was a relationship between travel intention and vaccine trust and travel confidence after vaccination, respectively, but the logic model was not sufficient to explain them. Thus, this paper suggests further analysing their relationship using other methods such as SEM.

The tourism literature on vaccination and tourism revitalization is linked and associated with the availability of COVID-19 vaccines [35,62,63]. The current research found that vaccination has a lesser impact on travel behaviour, where none of the clusters of VT, TC, and TI is directly associated with the TB cluster (refer to Table 3). However, there were independent items such as "vaccine helps to prevent infection", "low risk of being affected after vaccination during travelling", "reopen tourism sectors with high vaccination rate", "COVID-19 travel insurance is not necessary after vaccinated", and "vaccination rate of tourism workers" that were found related to their travel behaviour.

The logit model further explained that the view that the vaccine helps to prevent infection has positively influenced travel behaviour. On the other hand, factors such as "perceived low travel risk", "travel insurance", and "tourism worker vaccination rate" were predicted to negatively affect travel behaviour. Hence, the results partially accepted H4, whereby increased confidence in vaccinations results in travel behaviour, whereas H5 was rejected, as increasing confidence in travel does not drive travel behaviours. This might be due to more concerns regarding travel risk, travel insurance, and tourism workers' vaccination rate due to which people more likely opt not to travel, as these elements were also identified as travel constraints in the previous studies [64–67].

7. Implications, Limitations, and Future Research

This study helps to fill the existing knowledge gap in the literature and proposes some suggestions to practitioners, but some limitations are worth being acknowledged and should be further explored. The findings of this study outlined that COVID-19 travel insurance is a necessity for travellers even after being vaccinated, but the impact of the criteria of the coverage on COVID-19 travel insurance on travel confidence and travel behaviour remains unclear [66,68]. The theoretical contribution of this study is the review and application of several theories in measuring the progression, including the first four stages of TTM (pre-contemplation, contemplation, preparation, and action), PMT's coping strategies to the health threat, and vaccine concerns [5] and HBM. TTM states that behavioural changes involve progression through six different steps, but only four steps were used in this study due to the timeline. (In the early stage of travel, restrictions were lifted in Malaysia.) In future study, the last two stages (maintenance and termination) of TTM should be taken into account to complete the vaccination cycle to address the pandemic threat of COVID-19.

The second part of PMT's coping strategies describes vaccine trust and travel confidence together with threat appraisal perception, which has also been widely studied [27,64,65,69]. Threat appraisal threat should be included in future studies. Vaccine concern and HBM were used to develop the measurement items to examine vaccine trust and travel after vaccination. Future research could look at the timing and financial concerns to understand the prospect of vaccine adoption and its impact on the confidence in vaccination. This is because temporary vaccination stations will be closed, and the vaccination process will be more time-consuming; in addition, a charge of payment will be incurred for vaccination [70]. JR (2022) reported that Malaysian Health Minister Khairy Jamaluddin announced that the National Immunisation Programme for Children (PICKids) would be ended on 15 May 2022 because the government could not afford to extend the deadline due to the expiring of the supply. Children from 5 to 12 years old who are yet to be vaccinated have to pay for the first dose of the COVID-19 vaccine.

In addition, perceived risk is often found to significantly and negatively influence vaccine intention [4,38,71] and travel intention [38,50]. This study has several managerial implications for tourism stakeholders and destination marketers: travel insurance was associated with reducing risk exposure during travel [66]; this research provides evidence in line with studies [67,68,72] that found that COVID-19 travel insurance is a necessity even after being vaccinated. Thus, insurance companies could cooperate with travel agencies to offer COVID-19 travel insurance to tourists in order to rebuild travel confidence. It is of note that people who are concerned about destination tourism workers' vaccination status would impede their travel behaviour. This paper, therefore, suggests that destination management should make sure their workers have been fully vaccinated before serving and provide proof or share their vaccination status with the public. Although vaccination to some extent can positively influence traveller confidence, the destination still needs to create a safe environment in which tourists can trust each other through aggressive measures (e.g., space carrying the capacity to support social distancing, placing hand sanitizer dispensers in prominent areas around tourist attractions, etc).

The data analysis involved only vaccinated respondents. The distinctions between vaccinated and unvaccinated individuals regarding travel intention and travel behaviour can be explored if further studies extend the sample to both vaccinated and unvaccinated respondents. In addition, this research can be considered as the primary study on travel behaviour, as it was performed about 6 months after 10 October 2021, when Malaysia lifted travel restrictions for fully vaccinated people [14]. It also can be used as the basis for the comparison made 6 months later. By doing so, we can keep track of the vaccination timeline for tourism rebooting as well as travellers' perceptions of VT, TC, TI, and TB in the future.

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