SINGAPORE HAZE & THEORY OF PLANNED BEHAVIOR

10/11/2013

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1 SUMMARY OF MAIN ISSUE

In the June of 2013, a haze pollution episode severely affects large areas in Southeast Asia. The haze is attributed to the emissions of an estimated 16,500 ha of vegetation burnt (Lim & Teo, 2013) on the Indonesian islands Sumatra, especially Riau province.

Figure 1-1 The extent of the haze (NEA, 2013)

There has been a periodic incidence of fire-related haze episodes in Southeast Asia since 1970s. From June to October, Slash-and-burn (S&B) is employed for vegetation clearance during dry southern monsoon season (Olson, Baum, Cahoon, & Crawford, 2012). Such S&B practice would be difficult to eradicate, as a traditional, perceived as cheap and convenient method.

2 THEORETICAL PERSPECTIVES

2.1 INTERRELATIONSHIP OF THREE DETERMINANTS

Positively interconnecting relationship exists among 3 determinants of Theory of Planned Behavior (TPB) - Attitude, Subjective Norms (SN), Perceived Behavioral Control (PBC).

Interaction of Attitude and SN. Attitude and SN conceptually overlapping (Shepherd & O'keefe, 1984). The predictability of an individual's attitude on behavioral intention is positively contingent on SN, and vice versa (Warner & DeFleur, 1969) (Andrews & Kandel, 1979). In Miniard and Cohen's experiments, isolated manipulation of either Attitude or SN affected both determinants (Miniard & Cohen, 1979).

Interaction of Attitude and PBC. Attitude and PBC are interactive. An individual has to consider the possible failure of performing the behavior as well as success, when does not have complete PBC (Ajzen, 1985); thus a positive attitude will enhance the intention when the individual perceives high controllability, and vice versa (Eagly & Chaiken, 1993). Additionally, Attitude and PBC share a common sub-determinant - perceived difficulty (Kraft, Rise, Sutton, & Røysamb, 2005). Such sub-determinant further entwined Attitude and PBC.

Figure 2-1 Interactions of three determinants

2.2 PBC AND INTENTION TO BEHAVIOR

Interaction of Intention and PBC. The attempted Behavior rather than actual Behavior can be solely predicted by Intention (Ajzen, 1985). Given that an individual does not have sufficient PBC, even if one's Intention is strong, the significant relationship between Intention and Behavior will hardly be observed (Triandis, 1977). Therefore, the interaction of Intention and PBC will better predict actual behavior.

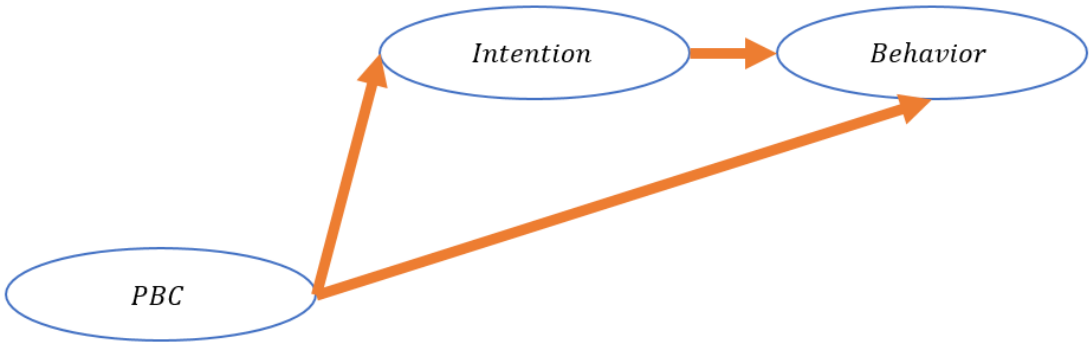

Figure 2-2 Interaction of PBC and Intention

2.3 CLAIMS OF THE ARGUER

The arguer points out 5 considerations in S&B, could be consistent with the 3 determinants in TPB. The claimed linkages are summarized as:

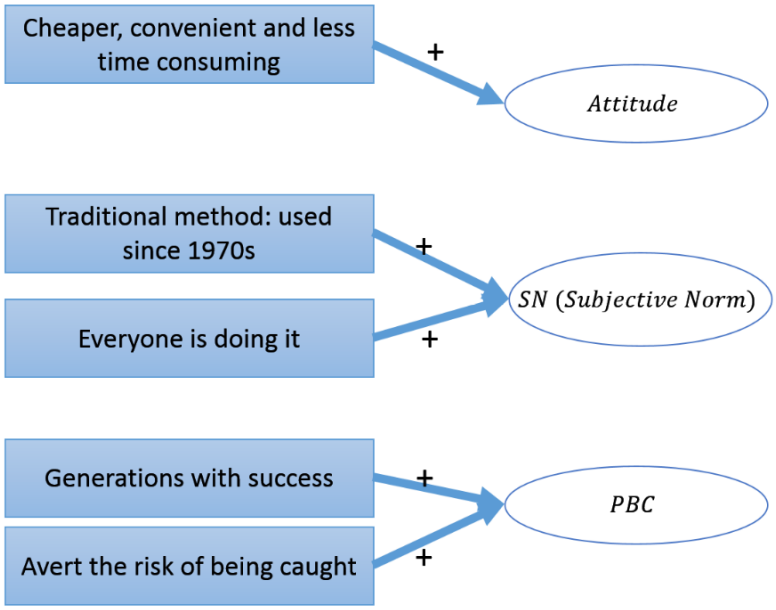

Figure 2-3 The arguer's claims

If considering the interactive effects of the three determinants, a network relationship emerges:

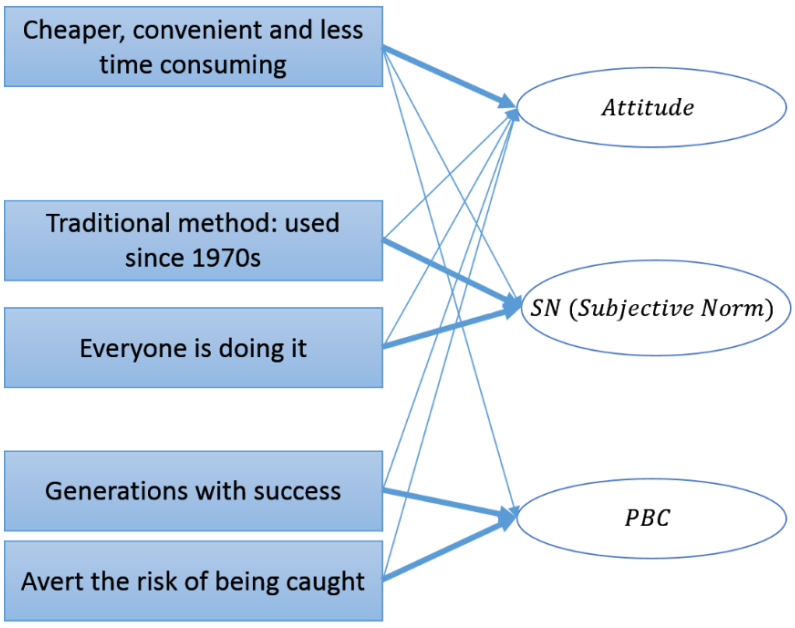

Figure 2-4 Network relationship

3 QUALITY OF SUPPORTING EVIDENCES

3.1 EVIDENCE COMPLETENESS FOR ATTITUDE

Attitude. Attitude consists of the attitude toward successful performance and the attitude toward the failed attempt (Ajzen, 1985):

$$Attitude = Attitude_{success} + Attitude_{failure}$$

Possibility of failure. The arguer fails to provide evidence to support the claim of "generations with success". The S&B had already gone awry several times. The consequence of 1997 S&B resulted in fire-affected land of 9,755,000 ha, equivalent to size of Portugal (BAPPENAS; ADB, 1999) (Tacconi, 2003). Thus farmers have perceived more possibility of failure, which negatively affects Attitude.

Vegetation type	Sumatra	Java	Kalimantan	Sulawesi	West Papua	Total
Montane forest					100,000	**100,000**
Lowland forest	383,000	25,000	2,375,000	200,000	300,000	**3,283,000**
Peat and swamp forest	308,000		750,000		400,000	**1,458,000**
Dry scrub and grass	263,000	25,000	375,000		100,000	**763,000**
Timber plantation	72,000		116,000			**188,000**
Estate crops	60,000		55,000	1,000	3,000	**119,000**
Agriculture	669,000	50,000	2,829,000	199,000	97,000	**3,843,000**
Total	**1,755,000**	**100,000**	**6,500,000**	**400,000**	**1,000,000**	**9,755,000**

Source: BAPPENAS-ADB (1999).

Table 3-1 Estimates of fire affected areas in 1997/98

3.2 EVIDENCE ACCURACY FOR SUBJECTIVE NORMS

Not "everyone is doing it". The arguer fails to substantiate the evidence to support the claim that "everyone is doing it". Conversely, the Roundtable for Sustainable Palm Oil (RSPO) has set up the role models of pursuing zero-burning policy. RSPO has strived to achieve its vision and mission (Maitar, 2013), and the RSPO has an increasing presence and influence in the palm oil industry.

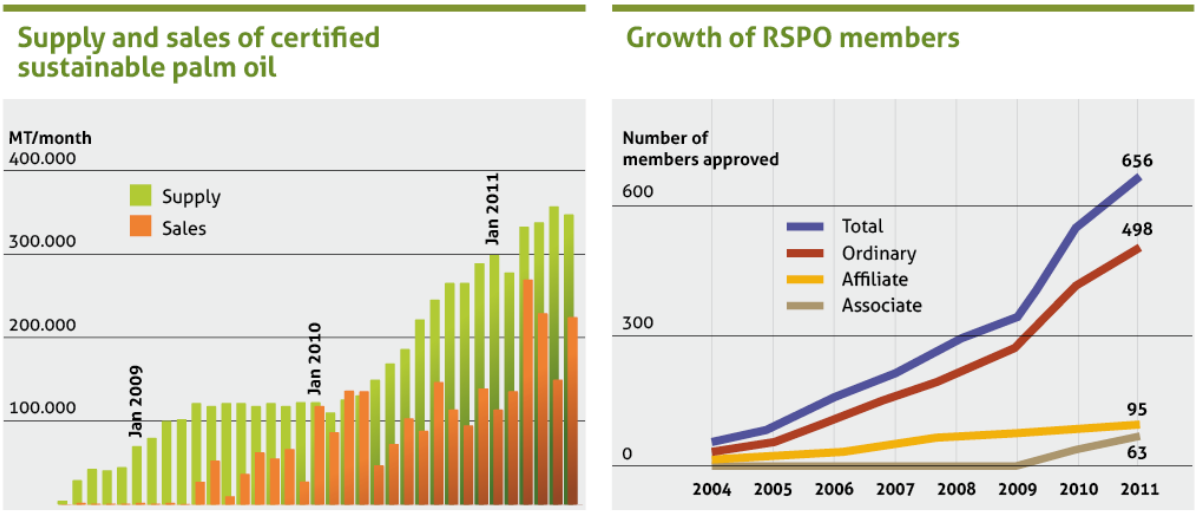

Figure 3-1 Growing importance of RSPO (Tan, 2011)

3.3 EVIDENCE RELEVANCE FOR CONTROL

Self-efficacy issue. Self-efficacy is upon internal factors, dealing with the ease of difficulty of performing a behavior (Ajzen I. , 2002). The arguer claims that the farmers have strong self-efficacy over S&B as evidenced by some techniques of averting the risk of being punished. However, those techniques will no longer be effective in the near future; therefore the evidence will be no longer relevant. The Indonesian government has intensified the enforcement of 2009 law (Woo, 2013). In-depth investigations through land licenses and on-site evidence collection will trace the culprit despite the complex land ownership (Jakarta, 2013).

4 KEY ASSUMPTIONS AND CONTEXT

4.1 ASSUMPTIONS WHEN EVALUATING ATTITUDE

Direct cost. In the context of farmers' view, assuming that only direct cost is relevant to them, S&B would perfectly become a cheaper method, compared to mechanical one.

Indirect cost. There are underlying indirect costs. Example would be the cost of hampered Indonesian business activities with neighboring countries in ASEAN (Tacconi, 2003). Moreover, many plantation companies have had zero-burning policy due to high although indirect cost of reputation damage (Fernandez, 2012). In the context of companies' view, assuming that they care about the long-term profitability, the S&B cost will unfavorably affect Attitude.

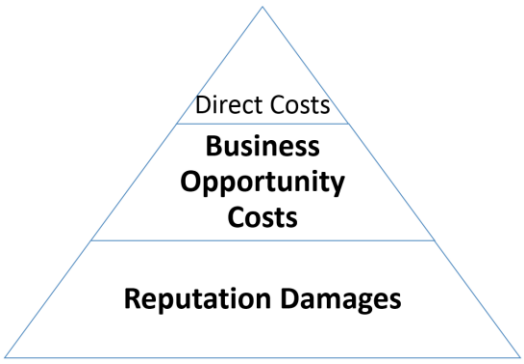

Figure 4-1 Cost considerations

4.2 MORAL BEHAVIOR CONTEXT

Moral Norms. One must be cautious about stronger determinants in different contexts of behavior (Conner & Armitage, 1998). Moral norms are defined as a person's "perception of the moral correctness or incorrectness" of performing a behavior

(Sparks P. , 1994). Under the context of carrying out behaviors with a moral or ethical dimension, Moral Norms significantly predict intention and attitude (Sparks, Shepherd, & Frewe, 1995). In this case, S&B involves strong moral obligation under increasingly concerns of greenhouse gas (Fearnside, 2000) and haze pollution (Nichol, 1997) from both local and international communities.

Relationship	*N* of tests[a]	Fisher's *Z*	*r*[b]	r^2
Moral norm–behavioral beliefs	2	0.41	.39	.15
Moral norm–attitude	10	0.54	.49	.24
Moral norm–subjective norm	10	0.35	.34	.12
Moral norm–PBC	10	0.24	.24	.06
Moral norm–intention	11	0.55	.50	.25
% variance in intention added	10	0.19	.19	.04

[a]Reviewed studies marked in reference list. [b]Weighted by *N* of subjects.

Table 4-1 Role of Moral Norm (Conner & Armitage, 1998)

4.3 PBC – ASSUMPTION OF WEATHER

Desired weather. Under desired weather conditions, farmers reasonably have sufficient PBC of use of fire, since they have numerous techniques of confining the S&B area such as waterways.

Undesired weather. The unexpected weather factor can deteriorate the PBC. For instance, the Nino Southern Oscillation (ENSO) while fire itself is not the decisive factor, is determined to the most significant risk factor for the generation of smoke haze in 1997 (Heil & Goldammer, 2001). Therefore, farms actually perceive less controllability over the fire use in S&B due to varying weather and climate conditions.

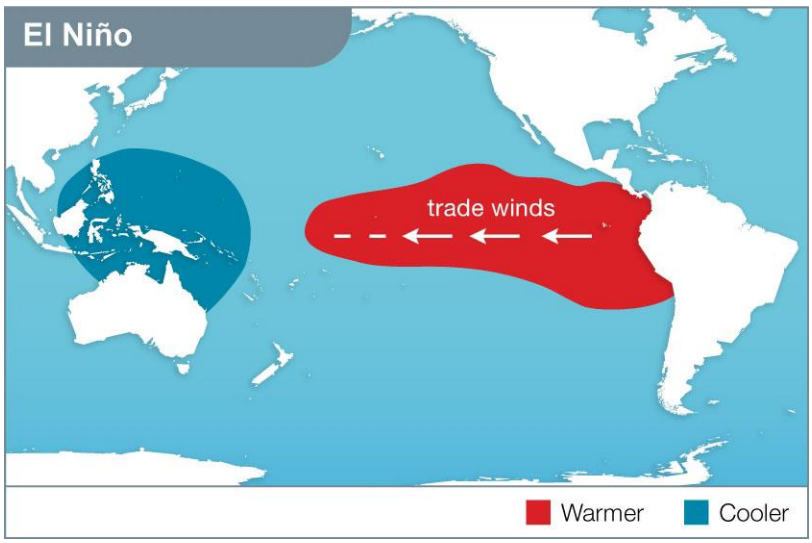

Figure 4-2 ENSO climatic changes (State Government of Victoria, 2011)

5 CONCLUSIONS AND MANAGERIAL IMPLICATIONS

5.1 SUMMARY

To better support that S&B is hard to eradicate, the arguer needs to provide more evidences to substantiate the alignment of S&B and determinants of TPB. The claim is plausible but may become invalid when changing assumptions or context.

Admittedly, S&B would be indeed hard to eradicate unless some actions are taken.

5.2 ACTIONS TO BE TAKEN

There are numerous currently available actions to be taken to mitigate the haze pollution derived from S&B, as summarized below:

Actions	Details
Closing knowledge gap	Future policy assessments and research should target to impart knowledge to farmers and companies, improving the understanding of damaged caused by fire to forest functions and climate (Tacconi, 2003).
Role-model of RSPO	RSPO should continue to build-up the role model of employing zero-burning policy, dedicated to making palm oil production process more environmentally-friendly (RSPO, 2012).
Regulation compliance	Indonesian government should intensify the environmental law enforcement (Woo, 2013). The government also needs to take urgent efforts against domestic bureaucratic corruption.
Subsidy to environmental-friendly land clearance	The Yudhoyono administration can subsidize to the mechanical land-clearance method, offering capital incentives for maintaining atmospherically-friendly practice (Xi, 2013).
Regional cooperation	Haze preventive and mitigating regional cooperation can be carried out, including information sharing on zero-burning agricultural technologies, regional firefighting collaboration, and better peat land management techniques (Ewing, 2013).

Table 5-1 Current available mitigating actions

5.3 OUT-OF-BOX SOLUTION

S&B trading. The government can introduce S&B trading system, using the market's invisible hands to achieve socially optimal results. S&B trading system is based on

the emissions trading system proposed back in 1970s (Burton & Sanjour, 1970). The Indonesian government can set a cap on the amount of peat land can be S&B. The S&B permits are traded among companies in S&B trading system. Companies are required to hold the amount of permits equivalent to their S&B area. Therefore companies with relatively low cost of non-burning clearance method will opt out of the S&B method and sell the permits, while other companies with high alternative cost will buy them. Consequently, under the assumption that the government can enforce the legal compliance of permits and total cap, the overall economic cost of meeting S&B cap is minimized.

Indonesian government and ASEAN have a long way ahead of solving haze pollution; nevertheless we all understand:

> *"We do not inherit the earth from our ancestors; we borrow it from our children."*
>
> *-- David Brower*

Word Count: [982][1]

[1] Excluding headings, picture and table captions, texts in tables, footnotes, and in-text citations.

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