Managing Crime Perception Using the TRIZ: A Malaysia Case Study

Chee Sheng Keong[1*], Mum Wai Yip[2], Nikalus Shu Luing Swee[3], and See Chew Tai[4]
Centre for Pre-University[1]
Faculty of Engineering and Built Environment[2]
Faculty of Applied Sciences and Computing[3]
Faculty of Engineering and Built Environment[4]
Tunku Abdul Rahman University College, Malaysia
keongcs@mail.tarc.edu.my[1], yipmw@mail.tarc.edu.my[2]
sweesl@mail.tarc.edu.my[3], taisc@mail.tarc.edu.my[4]
**Corresponding Author*

Received 6 Aug 2013; received in revised form 17 Nov 2013; accepted 3 Dec 2013

Abstract

This paper aims to provide an analysis of the application of the Theory of Inventive Problem Solving (TRIZ) in managing crime perception in the Malaysian context, and to compare the ideas generated by the TRIZ with solutions that have been implemented in Malaysia. TRIZ offers an alternative method of generating ideas to manage the crime perception of Malaysians. The majority of Malaysians still think that the crime rate in the country is very high, even though the fact is that the crime rate has dropped from 2009 to 2011. According to literature reviews, police capabilities, a distrust of statistics, government confidence, fear of crime, and the media have influenced the perception of the public. TRIZ is a powerful tool which can be used in problem solving. Therefore, TRIZ is used to identify the root cause of the problem and to generate solutions. The general solutions or the inventive principles suggested by the TRIZ are preliminary action, rushing through, blessing in disguise, local quality, mechanical substitution, parameter changes and thermal expansion. These inventive principles are used in the generation of the specific solutions. Based on the suggested solutions and the current steps being taken by the country, Malaysia has done its best to manage the public's perception of crime but there is still room for improvement by using the media to lower the perception.

Keywords: TRIZ, theory of inventive problem solving, crime perception, contradiction, cause and effect chain analysis, inventive principles

1. Introduction

Combating crime is a major issue for almost every country, including Malaysia. The crime rate in Malaysia rose from 2003 to 2007 (Centre for Public Policy Studies (CPPS), 2008; Haron, Roosli, and Kamal, 2012). The increase in crime was due to rapid urbanization and the growth of population. 90% of crimes in Malaysia were property crimes, the occurrences of which were mainly in residential areas (Sidhu, 2005). Facing such an alarming situation, a number of steps have since been taken to combat crime. The Reducing Crime NKRA (National Key Result Areas) under the Performance Management Unit (PEMANDU) of the Prime Minister's Department has come up with various initiatives, such as policing infrastructure, human capital and technology, to fight crime (PEMANDU, 2012). The result is encouraging as the combined effort of these initiatives has led to a reduction in street crime. According to Jala (2012), there were 210,000 crimes in 2009, which had dropped to below 160,000 in 2011. Based on the statistics in Figure 1, it shows that

Malaysia is now a safer country. However, the public still believes that the crime rate in the country is high and blames the government and the police force for not doing enough. In addition, empirical studies on crime perception in Malaysia are mainly based on public opinion of the police (Nair, Luqman, Vadeveloo and Marimuthu, 2012; Nair, Luqman, Vadeveloo, Shanmuggam and Iskandar, 2013).

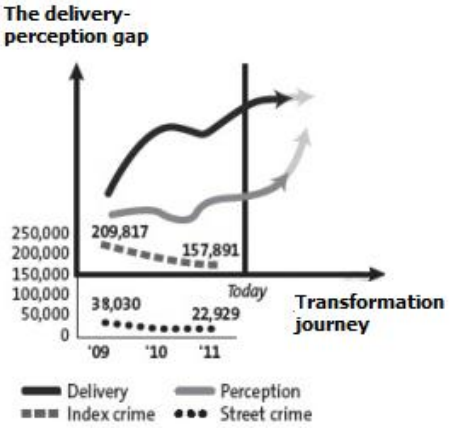

Figure 1: The Crime Statistics and Crime Perception
Source: Jala, I. (2012)

The purpose of this study is not to discover the source of crime but to present an alternative method to compliment the previous studies in generating ideas to manage crime perception. This is done by using TRIZ to compare the ideas with the solutions that have been implemented in Malaysia so far. The TRIZ process to solve the high crime rate perception begins with the understanding of the problem statement. This is followed by the identification of the root cause to find the specific problem to be solved and the use of TRIZ tools to generate ideas that can be used as solutions.

2. Literature Review

2.1 TRIZ

TRIZ is an acronym for the Russian phrase "Teoriya Resheniya Izobretatelskikh Zadatch" or “The Theory of Inventive Problem Solving”. According to Guin, Kudryavtsev, Boubentsov and Seredinsky (2009), TRIZ fills the void, inherent in other conventional product development tools, in the area of idea generation and concept development.

TRIZ was discovered by a Russian engineer, scholar, and inventor Genrich Altshuller in 1946 when he started reviewing patents whilst looking for clues about how inventive people solve problems. (Kaplan, 1996; Altshuller, 1999; Altshuller, 2005). He studied 200,000 patents, which were then narrowed down to 40,000 innovative patents. The three primary findings of the TRIZ were that problems and solutions were repeated across industries and sciences, patterns of technical evolution were repeated across industries and sciences, and lastly, innovations can be achieved by using scientific effects from outside the field where they were developed (Sheu and Lee, 2011). At the heart of the TRIZ, the three main concepts, whereby at least one of them is used in any TRIZ problem solving process, are contradiction, ideality and pattern of evolution (Ilevbare, Probert and Phaal, 2013).

Contradictions are due to the incompatibility of desired features within a system which contains both desired features (improving parameters) and undesired features (worsening parameters). Solving the contradiction is the key element for innovation (Kiatake and Petreche, 2012). Ideality was introduced by Altshuller (1999) to describe how closely a system performs its function to its best possible or to the ideal final result (IFR). Altshuller observed that the development of engineering systems follow certain patterns (trends). According to Savransky (2000), the evolution of the systems can be expressed as a development to achieve ideality.

Since the discovery of TRIZ in 1946, Altshuller and his colleagues developed several tools and techniques. In an overview of the development of the TRIZ tools and concepts from 1946 to 2008, the tools which appear most prominently are 40 inventive principles, 76 standard solutions,

effects database, separation principles, contradiction matrix, patterns of evolution for the technical systems, IFR, fitting, function analysis, substance field (Su-field) analysis, analysis of system resources, nine windows, creativity tools, and Algorithm of Inventive Problem Solving (ARIZ) (Souchkov, 2008; Ilevbare et al., 2013). Cameron (2010) classified some of the TRIZ tools into a model of problems and a model of solutions (Table 1).

Table 1: TRIZ Tools

Model of Problems	Model of Solutions
Technical Contradiction	40 Inventive Principles
Physical Contradiction	Separation, Satisfaction, By-pass
Su-field model	76 Standard Inventive Solutions
Function Statement	Scientific Effects
Search for Trend Solutions	Trend of Evolution

According to Yeoh, Yeoh and Song, (2009), a typical problem solving method is to find a specific solution for a specific problem. If the breakthrough solution cannot be found, then problems solvers can apply the TRIZ way of problem solving (Cameron, 2010) (Figure 2).

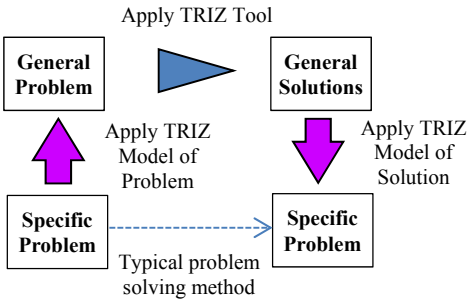

Figure 2: The TRIZ Way of Problem Solving Adapted from Yeoh et al. (2009) and Cameron (2010).

In order to apply the TRIZ tools, problem solvers must re-state the problem in the form of a general problem, such as technical contradiction, physical contradiction, Su-field model, function statement or a search for a trend of evolution. Based on the general problem, TRIZ provides a list of general solutions in the form of a model of solutions, such as 40 inventive principles, separation, satisfaction, bypass, 76 standard inventive solutions, scientific effects and the trend of evolution. Finally, the problem solvers have to take the decision of which specific solution is to be used (Yeoh et al., 2009; Cameron, 2010).

Recent TRIZ research has resulted in extending the TRIZ applications into non-technical areas, such as business (Mann and Domb, 1999; Mann, 2002), education (Marsh, Waters, and Mann, 2002) service operations management (Zhang, Chai, and Tan, 2003), quality management (Retseptor, 2003), Eco-innovative design (Chen and Chen, 2007) and health service management (Lin, Chen and Chen, 2012).

TRIZ has the advantage over other methods such as brainstorming, mind mapping, lateral thinking and morphological analysis as these are only able to identify a problem and its root cause but are relatively weak in generating the solutions when compared to TRIZ (Ilevbare et al., 2013). The strength of TRIZ is in idea generation (Guin et al., 2009). As a result, TRIZ is able to reduce the time spent on generating ideas to find solutions.

Many causes of crime rate perception are contradictory (Duffy, Wake, Burrows and Bremner, 2008). According to Yeoh et al. (2009), when using a typical problem solving method to solve a contradictory problem, users may end up generating a compromise solution that circumvents the contradictions instead of solving the root cause. TRIZ problem solving process can be used to resolve contradictions while providing an inventive solution. The following TRIZ process, as shown in Figure 3, is adapted from Yeoh et al. (2009) and will be elaborated further in section 3.

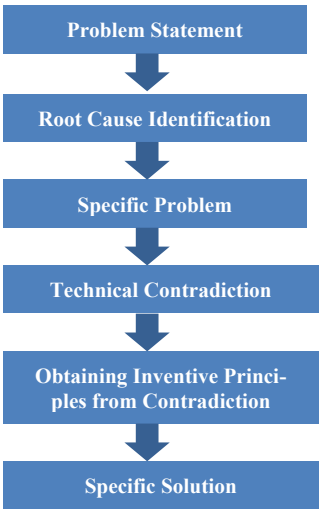

Figure 3: TRIZ Process

2.2 Perception of Crime

The perception of crime is the psychological perception of a society toward their reaction and thoughts of crime. The perception of crime has been noted as one of the indicators that can measure the success of fighting crime. Duffy et al. (2008) cited from the source 'Cutting Crime: A New Partnership 2008-2011' that

"If crime falls but people do not see and feel that fall, their quality of life is affected and the benefits of reduced crime are not being realized" (p.40)

The perception of crime may damage a society as much as the crime itself as people cannot perform their daily routine as they are too scared to socialize and do business. For years, experts have noticed that the perception of crime spikes as crime falls. Experts call it 'trailing indicator', which means the actual crime rate, whether good or bad, will only be matched by the perception some time later (The Choice, 2012). One notable example was reported by The Economist (2012) that in Britain, the perception of local crime took almost 12 years (1998 – 2010) to catch up with overall decline in the crime rate. In 2011, when people started to perceive that they were safe, the crime has actually risen.

Why is there a high perception of crime when the number of crimes has actually declined? The following reasons are compiled from the local daily newspapers, online news and literature reviews.

The public perceives police incapability as one of the reasons. In certain cases, the public has blamed police officers for ignoring information given to them (Lopez and Lukinbeal, 2010). Police officers ignore information due to their inability to deal with so many cases at once and the public perceives that police are numb when handling crime reports and slow to take action (The Star Online, 2012b). The Star Online (2012a) reported that there are 110,000 police personnel serving 28.3 million people in Malaysia, equating to one policeman for every 257 people. However, at the local level the number of police bases or stations, and the number of personnel often cannot keep pace with the rapid development in many districts where housing estates are quickly expanding. On the other hand, the police blame the public for their reluctance to come forward to give evidence after they lodge police reports and not wanting to testify in court for fear of the lengthy court process and fear of personal safety from any repercussions (Wong, 2012; Lopez and Lukinbeal, 2010). The public are reluctant to cooperate with the police because they are concerned with the level of corruption, brutality, infringement, and the abuse of human rights by the police (Teh, 2008; Nair et al., 2012; Nair et al., 2013). Duffy et al. (2008) and Nair et al. (2012), stress the importance of public relation work by the police and that they need to be more effective in combating crime in order to regain public confidence and win their cooperation. According to Jesilow, Meyer, and Namazzi (1995), lack of public cooperation leads to a demotivated police force and possibly more crime in the future.

The public perception of crime might be a signal of confidence from the public towards the police force and the government. The public distrusts the crime statistics may be due to the fact that the public thinks that the data may have been manip-

ulated, thus not reflecting the true situation of inadequate crime-fighting efforts. This reason could be due to the fact that several such cases have been reported in the local independent media, such as Malaysia Kini and Malaysia Insider. The Choice (2012) and Duffy et al. (2008) claim that there are cases whereby the efforts of the police force and government are undermined by certain parties because of political reasons.

The fear of crime can influence public crime perception and encourage people to have a false sense of insecurity, independent of the crime itself (The Economist, 2012). According to Carvalho and Lewis (2003), the fear of crime generally occurs at higher rates than recorded victimization. Matei, Ball-Rokeach, and Qiu (2001) report that people living in high crime areas have less fear of crime, while those living in lower-crime neighborhoods have more fear. A study conducted by Nair et al. (2013) found that respondents felt that the recently repealed Emergency Ordinance (EO), which enables detention without trial, should be reinstated. The EO is regularly used to detain those deemed to be subversive by the government, such as high profile criminals. However, Puah (2013) refuted the allegation that the repealing of the EO would increase the crime rate. He felt that this would merely mask the inefficiency of the police. He further claimed that

"…only nine percent of the total 120,000 police personnel are attached to the CID departments that is the forefront of combating crimes" (Puah, 2013, p. 25).

The fear of crime is influenced by the media, such as newspapers, and also alternative online media. According to Sandstig (2010), the media reinforces the public personal experience and social experience towards crime. Research by Duffy et al. (2008) shows that, in general, the media coverage of crime is negatively biased People might generalise 'signature' crime reported by the media, particularly homicide, sexual offences and child abduction as a signal that the crime rate in the country is very high. Nair et al. (2013) found that most of the educated members of the public living in urban areas registered a higher fear level of being a crime victim because they read newspapers. In addition, alternative online media have reported a higher incidence of crime in society. People become frightened by the report that no less than one person gets murdered, raped or robbed daily. Wong (2012), however, claims that crimes are understated because many victims do not report the incidents and the information released by the police press conferences may not fully reflect the actual situation. Sandstig (2010) found that those that believe media coverage on crime is understated have a greater feeling of fear and insecurity

3. TRIZ Process

3.1 Problem Statement

The public's perception of crime is higher than the actual crime rate. The public's perception of crime is a key driver of the overall views of the government, as well as the public's quality of life (Duffy et al., 2008). Therefore, the public perception of crime will have an impact on the well being of the people and the country.

3.2 Root Cause Identification

The literature review in section 2.2 highlighted various reasons for high crime perception. The next step is to identify the root cause. The root cause identification is carried out using the cause and effect chain analysis (CECA). The CECA was described as "logically directed brainstorming" by Cameron (2010). The solution generated will not work if the real root cause is not found. The CECA process that we applied is based on Yeoh et al. (2009) and Cameron (2010). The CECA starts with a target problem which is stated in the first problem box that is "public crime perception is high". Starting with the target problem, it is possible to determine the possible reasons by asking the question 'why?' Each possible answer is inserted into a new box and is then connected to the first problem box.

The root cause analysis ends when a terminal box is reached. A terminal box is the point whereby there is no more ideas to continue (no more 'why') (Cameron, 2010). For example, the theme of this paper is crime perception. The target problem is that the public perceives that the crime rate is very high. Based on the literature review, the high level causes are that the public perceive the police as not being capable, the public fear of crime and the public's distrust of the statistics. Taking one of the causes, such as the public perception of the ineptitude of the police, the next level cause is the problem whereby police ignore information and are too slow to take action. The same process is carried out for other problems to find the causes to these problems. The CECA for public crime perception is shown in Figure 4. The CECA shows that the root causes reach the terminal at two boxes, one at the media reported and the other one being that the police have too many cases to handle. These two are identified as the potential root causes of the public's crime perception..

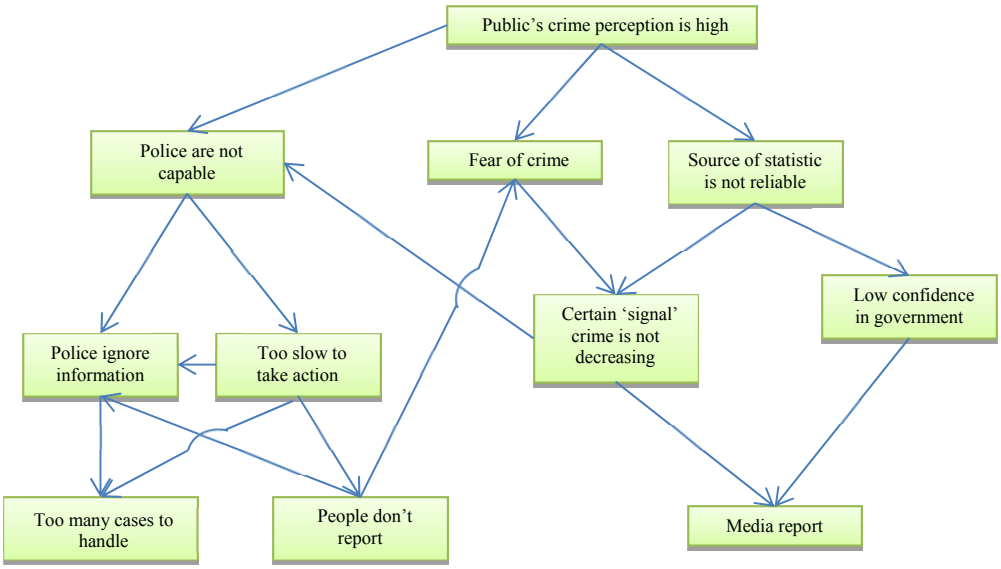

Figure 4: CECA of Public's Crime Perception

3.3 Specific Problem

The CECA above is based on the theoretical evidence offered in the literature review in section 2.2. The CECA leads to a redefinition of the original problem and the definition of a number of different new specific problems to address (Cameron, 2010). A specific problem is the actual problem to be solved (Yeoh et al., 2009). The starting target problem is that the public perception of crime is high. The specific problem, derived after analysis, is how to manage the media reports and the number of cases to handle in order to improve the public's perception of crime.

3.4 Technical Contradiction

TRIZ has many tools to solve a problem, but the specific problem to be solved must be restated in the form of one of the general problems, such as a technical contradiction, physical contradiction, Su-field model, function statement or search for the trend of solution (Cameron, 2010). The original TRIZ contradiction is a technical contradiction, which is when an attempt to improve one characteristic of the technical system results in the worsening of another characteristic (Yeoh et al., 2009). An administrative contradiction normally arises from how management can be converted into a technical contradiction by converting

the various parameters into one of the 39 technical parameters created by Genrich Altshuller. The 39 technical parameters are derived from the patent database that enables problem solvers to describe the features or functions of the technical systems. However, the mapping of real world problems into the 39 technical parameters is not an easy task and requires a certain amount of experience and practice (Gadd, 2011). Gadd (2011) suggested that problem solvers pay more attention to the suggested principles than finding the perfect contradiction. As a result, the authors have made sure that the technical contradiction statements formulated are backed by literature so that the inventive principles can be generalized to solve the problem of high crime perception.

The technical contradiction is normally stated through the use of an "if-then-but statement: if something is done, then parameter *x* improves but parameter *y* worsens", in order to clearly define the problem and to determine which parameters are in contradiction with each other (Yeoh et al., 2009). Improving the public's crime perception presents a contradiction. The function of the media is to inform people, but based on the literature review, the public become more frightened as more and more cases are being reported (Duffy et al., 2008; Sandstig, 2010; Nair et al., 2013; Puah, 2013).

The public is also disappointed by the inefficiency of the police (Teh, 2009; Lopez and Lukinbeal, 2010; Wong, 2012; The Star Online, 2012b). However, the police officers are overwhelmed with the large amount of cases, especially in the high population density areas (The Star Online, 2012a), and have insufficient numbers to combat crime effectively (Puah, 2013). TRIZ offers the solution to solve the contradiction instead of trade off. The following are the contradictions and the parameters that go with them.

Contradiction 1:

If the media reports the news, then the public will be informed, but the public may perceive that the country's crime rate is high.

	Altshuller's 39 Parameters
Worsening parameter: Public perceives the crime rate is very high	#31 Object-generated harmful factors
Improving parameter: Public is informed	#24 Information

Contradiction 2:

If the police receive many public crime reports, then the police will be able to solve some of the cases, but it will take too much time to solve all of them.

	Altshuller's 39 Parameters
Worsening parameter: Police take too much time to solve all the cases	#39 Productivity
I Improving parameter: Police are able to solve some of the cases	#10 Force

3.5 Obtaining Inventive Principles from a Contradiction Matrix

A contradiction matrix consists of two identical horizontal and vertical axes that include a list of 39 parameters. The inventive principles (solutions) can be obtained from the matrix cells. The vertical axis of the contradiction matrix is the parameter to be improved, whilst the horizontal axis of the contradiction matrix is the parameter that worsens (degraded). The intersection between the parameter to be improved and the worsening parameter provides problem solvers with the most frequently used inventive principles (Figure 5).

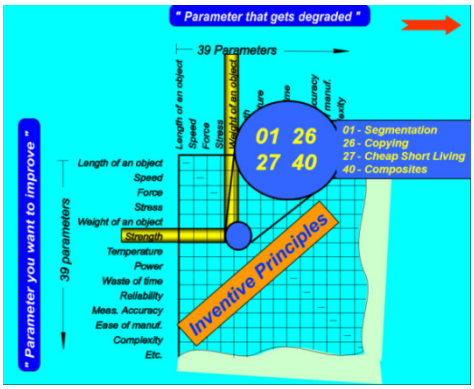

Figure 5: Contradiction Matrix
Source: GEN3 (2006)

Recommended Inventive Principle from Contradiction 1:

Contradiction Matrix	Inventive Principles
#31: Object-generated harmful factors (Worsening) X #24: Information (Improving)	#10 Preliminary action #21 Rushing through/hurrying #22 Blessing in disguise

Recommended Inventive Principle from Contradiction 2:

Contradiction Matrix	Inventive Principles
#39: Productivity (Worsening) X #10: Force (Improving)	#3 Local quality #28 Mechanical substitution #35 Parameter change #37 Thermal expansion

4. Specific Solutions and Discussions

4.1 Specific Solutions for Contradiction 1

The recommended TRIZ Inventive Principles are as follows:

#10 Preliminary action
#21 Rushing through/hurrying
#22 Blessing in disguise

Some issues that have been driven by the media are beyond governmental control, but there are significant actions that the police or the government can take (Duffy et al., 2008).

#10 Preliminary action means performing an action earlier than the occurrence of another event (Altshuller, 2005). At present, the Malaysian police are taking steps to boost its information technology security in order to combat the spread of false information and slander through social networks and the Internet (BERNAMA, 2013b). The editors of the news should edit the news before the news can be released to the public to tone down the fear that the news might create. Meanwhile, authorities should perform their duties to the utmost excellence at all times rather than 'fire fight' unwanted outcomes due to unprofessionalism.

#21 Rushing through/hurrying provides the idea that news related to a crime, when broadcast on air, should be reported continuously without any commercial break in order to shorten the news exposure time to the public so as to lessen the level of fear that the public might develop.

#22 Blessing in disguise or converting harm into a benefit provides the idea that instead of reporting only the negative aspect of the crime, the media should also report any positive aspect of the crime. According to The Star Online (2012b), authorities must not only do their job, but must be seen to be doing their job. The image of the authorities can be improved if what they do is reported positively by the media. At present, there are media programs that show how crimes are solved through the efficiency of the relevant units, the cooperation of the public and individual heroism. These programs teach crime prevention strategies to the general public that may further deter the crime from happening in the long run and strengthen the cooperation of different races in solving crime. The outcome of a case, such as whether the culprits are punished under law, should be emphasized as well to show the public that justice is being served and that the law enforcement is adequate in combating crime.

4.2 Specific Solutions for Contradiction 2

The recommended TRIZ Inventive Principles are as follows:

#3 Local quality
#28 Mechanical substitution

#35 Parameter changes
#37 Thermal expansion

Altshuller (2005) described #3 local quality as changing the characteristics of something in a specific area (locally) in order to gain a required functionality. The local authority can be tasked to improve safety. In Malaysia, the safe city programme has been implemented by 151 local municipal councils nationwide with 8,329 enhanced lighting posts, 1,311 safety mirrors, and 104.3 km of railings and bollards installed for the public's safety (PEMANDU, 2012). The police must be seen to be doing their job (The Star Online, 2012b), and as a result, policemen can be assigned to use public transport in order to save costs and at the same time monitor the surrounding public safety during the journey. Neighborhood watch or community policing programs can be set up so that the local community works together with the police to fight crime. The public are happy if they have a role in the community policing programmes (The Star Online, 2013b). Police have also suggested setting up crime prevention associations in schools to enhance students' awareness of crime prevention methods (BERNAMA, 2013a).

Based on #28 mechanical substitutions, new technology can be introduced to increase the efficiency of any crime prevention, such as installing cameras in hotspot areas so that the authorities can monitor the area from a distance and have a response team stationed nearby to combat any crime spotted. The police have introduced *MyDistress*, a digital distress button on a hand phone that, when pressed, sends a distress signal with the coordinate immediately sent to the authorities for speedy action (PEMANDU, 2012). Jala (2012) mentions that the police realise that the main complaint against them is the public's difficulty in making reports and taking action. As a result, an online system is being considered to track police investigations and to simplify the procedures for making police reports. At the same time, a crime prevention website has been set up to supply updated information on regularly held crime prevention public events, such as crime prevention talks, meetings, seminars, conferences, forums and exhibitions which the public can attend for free (The Star Online, 2013a).

#35 Parameter changes means changing the properties of an object or system to accommodate useful benefits (Altshuller, 2005). Increasing the frequency of police patrols requires many police officers and could incur a lot of cost. Therefore, under the omnipresent program, personnel comprising of policemen as well as the RELA (People's Volunteer Corps) and JPAM (Malaysian Civil Defence Department) members have been deployed in crime hotspots nationwide, covering shopping complexes and schools, and interacting with the people to make their presence felt. More than 3,000,000 volunteers have registered with RELA and JPAM. The Skim Rondaan Sukarela (Volunteer Patrolling Scheme) members have increased to 147,000 (PEMANDU, 2012).

According to Altshuller (2005), the principle #37 thermal expansion has been used for linear thermal expansion and contraction. However, it can also be used in other environmental fields to cause change, such as introducing a transparent merit system in the police force to increase their efficiency and productivity in lowering crime and improving the image of the police force. Steps must be taken to ensure that police officers obey the law.

The authors wish to point out that it is not necessary to apply all the inventive principles. TRIZ helps problem solvers to release their psychological inertia. Other principles can be considered if they are able to stimulate problem solvers to think of a better solution. Rantanen and Domb (2008) mentioned that some recommended inventive principles may not help. However, individuals have subjective interpretations in different contexts (Burns, 1995). As a result, different people may have a different interpretation of the same inventive principle.

5. Conclusion

The study serves as an example of how TRIZ solves contradictions which are prevalent in management. The TRIZ tools serve to guide brainstorming that can generate many ideas. In this case study, the crime perception can be managed by applying the TRIZ tools, particularly the inventive principles, such as preliminary action, rushing through, blessing in disguise, local quality, mechanical substitution, parameter change, and thermal expansion. TRIZ helps to generate feasible ideas which may lead to elegant solutions. The result shows that the Malaysian government has taken several positive steps to boost the country's public crime perception, especially in the area of law enforcement. However, more can be done by using the media to lower crime perception. The literature review has shown that lowering crime perception takes time so the result may not be obvious at the moment. Although solutions can be found quickly and systematically using TRIZ rather than using trial and error and unguided brainstorming, TRIZ requires a certain amount of experience and practice. There is also no doubt that different people may have different interpretations of the same inventive principle but these are still useful for creating ideas that can solve problems.

References

Altshuller, G. (1999). *The innovation algorithm: TRIZ, systematic innovation and technical creativity.* Worchester, MA: Technical Innovation Center.

Altshuller, G. (2005). *40 Principles extended edition: TRIZ keys to innovation.* Technical Innovation Center, Worcester, Massachusetts.

BERNAMA. (2013a). *Police suggest setting up crime prevention bodies in Tamil schools*. Retrieved 26 March, 2013, from The Star Online: http://thestar.com.my/news/story.asp?file=/2013/3/18/nation/20130318213733&sec=nation

BERNAMA. (2013b). *Police to shore up defences to takle cyber slanders*. Retrieved 26 March, 2013, from The Star Online: http://thestar.com.my/news/story.asp?file=/2013/3/24/nation/20130324172047&sec=nation

Burns, R. (1995). *The adult learner at work.* Sydney: Business and Professional Publishing.

Cameron, G. (2010). *Teach yourself TRIZ, how to invent, innovate and solve "impossible" technical problems systematically.* CreateSpace.

Carvalho, I. & Lewis, D. (2003). Beyond community: reactions to crime and disorder among inner-city residents. *Criminology, 41*(3), 779-812.

Centre for Public Policy Studies (CPPS). (2008). *Elections '08 Daily Policy Factsheet #4: Crime and safety.* Retrieved 23 March, 2013, from Centre for Public Policy Studies: http://cpps.org.my/resource_centre/Crime.pdf

Chen, J. L. & Chen, W.C. (2007). TRIZ based eco-innovation in design for active disassembly. *CIRP International Conference on Life Cycle Engineering*, *June 11-13*, (pp. 83-87).

Duffy, B., Wake, R., Burrows, T. & Bremner, P. (2008). Closing the gaps - crime and public perceptions. *International Review of Law Computers & Technology*, *22*(1-2), 17 - 44.

Gadd, K. (2011). *TRIZ for engineers.* West Sussex, UK: John Wiley and Sons.

GEN3. (2006). *GEN3 training maual.*

Guin, A. A., Kudryavtsev, A. V., Boubentsov, V. Y. & Seredinsky, A. (2009). *Theory of inventive problem solving: level 1 study guide* (pg. 51). Selangor, Malaysia: Firstfruits.

Haron, S. H., Roosli, R. & Kamal, E. M. (2012). Crime prevention and community safety in Malaysia from territorial functioning perspectives: an

updated review. *International Journal of Academic Research*, *4*(3), 42-46.

Ilevbare, I. M., Probert, D. & Phaal, R. (2013). A review of TRIZ, and its benefits and challenges in practice. *Technovation, 33*, 30-37.

Jala, I. (2012). *Transformation blues - while crime has gone down, it's an uphill task convincing the public it really has.* Retrieved November 12, 2013, from The Star Online: http://www.thestar.com.my/story.aspx?file=%2f2012%2f8%2f13%2fbusiness%2f11839102&sec=business

Jesilow, P., Meyer, J., & Namazzi, N. (1995). Public attitudes toward the police. *American Journal of Police, 14* (2), 67-88.

Kaplan, S. (1996). *An introduction to TRIZ.* MI: Ideation International.

Kiatake, M & Petreche, J. R. D. (2012). A case study on the application of the theory of inventive problem solving in architecture. *Architectural Engineering and Design Management, 8*, 90-102.

Lin, S. P., Chen, C. P. & Chen, J. S. (2012). Using TRIZ-based method to improve health service quality: a case study on hospital. *2012 2nd International Conference on Economics, Trade and Development IPEDR. 36.* Singapore: IACSIT Press.

Lopez, N. & Lukinbeal, C. (2010). Comparing police and residents' perceptions of crime in a Phoenix neighborhood using mental maps in GIS. *APCG Yearbook, 72*, 33-55.

Mann, D. (2002). Systematic win-win problem solving in a business environment. *The TRIZ Journal*. Retrieved from http://www.triz-journal.com/archives/2002/05/f/index.htm

Mann, D. & Domb, E. (1999). 40 Inventive (business) principles with examples. *The TRIZ Journal*. Retrieved from http://www.triz-journal.com/archieves/1999/09/a/index.htm

Marsh, D., Waters, F. & Mann, D. (2002). Using TRIZ to resolve educational delivery conflicts inherent to expelled students in Pennsylvania. *The TRIZ Journal*. Retrieved from http://www.triz-journal.com/archieves/2002/11/c/03.pdf

Matei, S., Ball-Rokeach, S. & Qiu, J. (2001). Fear and misrepresentation of Los Angeles urban space. *Communication Research*, *28*(4), 429-463.

Nair, G. K. S., Luqman, A., Vadeveloo, T. & Marimuthu, R. (2012). Better policing through a paradigm shift in public perception of the police. *Asian Social Science, 3* (8), 113-117.

Nair, G. K. S., Luqman, A., Vadeveloo, T., Shanmuggam, S. & Iskandar, H. (2013). Public confidence in police competency to combat crime. *Asian Social Science, 9* (4), 58-66.

PEMANDU. (2012). *Reducing Crime Annual Report 2011*. Putrajaya: Prime Minister's Department. Retrieved from http://www.pemandu.gov.my/gtp/annualreport2011/ebooks/Reducing_Crime_NKRA/files/assets/basic-html/page6.html

Puah, W. T. (2013, July 9). *Go for better enforcement to curb crime, not EO*. Retrieved September 2, 2013, from Malaysia Kini: http://www.malaysiakini.com/letters/235165

Retseptor, G. (2003). 40 Inventive principles with applications in service operations management. *The TRIZ Journal*. Retrieved from http://www.triz-journal.com/archives/2003/03/a/01.pdf

Sandstig, G. (2010). Media influences and effects on experiences of uncertainty and fear in urban public spaces. *Journal of US-China Public Administration, 7*(12), 66-84.

Sheu, D. D. & Lee, H. K. (2011). A proposed process for systematic innovation. *International Journal of Production Research, 49*(3), 847-868.

Sidhu, A. M. (2005). The rise of crime in Malaysia - an academic and statistical analysis. *Journal of the Kuala Lumpur Royal Police College, 4*, 1-28.

Souchkov, V. (2008). A brief history of TRIZ. Retrieved August 16, 2013, from www.xtriz.com/BriefHistoryOfTRIZ.pdf

Teh, Y. K. (2009). The best police force in the world will not bring down a high crime rate in a materialistic society. *International Journal of Police Science and Management , 11* (1), 1-7.

The Choice. (2012). *Malaysia's crime rate falling, but perceptions are worsening: why?* Retrieved 24 March, 2013, from The Choice: Because every Malaysian has to choose: http://www.thechoice.my/the-issues/51260-malaysias-crime-rate-falling-but-perceptions-are-worsening-why-

The Economist. (2012). *Law and order: Cockeyed Optimists*. Retrieved 24 March, 2013, from The Economist: http://www.economist.com/node/21556288

The Star Online. (2012a). *Big budget boost for crime-fighting efforts.* Retrieved 21 March, 2013, from The Star Online: http://thestar.com.my/columnists/story.asp?file=/2012/10/3/columnists/thestarsays/12118389&sec=thestarsays

The Star Online. (2012b). *Crime fighters must be seen in action*. Retrieved 24 March, 2013, from The Star Online: http://thestar.com.my/news/story.asp?sec=nation&file=/2012/10/17/nation/12183945

The Star Online. (2013a). *Website to aid in preventing crime*. Retrieved 26 March, 2013, from The Star Online: http://thestar.com.my/metro/story.asp?file=/2013/1/26/central/12483973

The Star Online. (2013b). *The people like working with the police in fighting crime.*. Retrieved 26 March, 2013, from The Star Online: http://thestar.com.my/news/story.asp?file=/2013/3/20/nation/12859959&sec=nation

Wong, C. W. (2012). *On the Beat: Do more to combat crime*. Retrieved 24 March, 2013, from The Star Online: http://thestar.com.my/columnists/story.asp?file=/2012/7/15/columnists/onthebeat/11667142&sec=On%20The%20Beat

Yeoh, T. S., Yeoh, T. J. & Song, C. L. (2009). *TRIZ: systematic innovation in manufacturing.* Selangor, Malaysia: Firstfruits.

Zhang, J., Chai, K. H.& Tan K. C. (2003). 40 Inventive principles with applications in service operations management. *The TRIZ Journal*. Retrieved 12 November, 2013 from http://www.triz-journal.com/archives/2003/12/d/04.pdf

About Authors

Chee Sheng Keong is a chemistry lecturer of Centre of Pre-University Studies. He holds a degree in Chemistry and Biology and a master in Environmental Science Majoring in Integrated Water Resource Management and currently pursuing Phd in Education in the area of problem solving and thinking skill. He is a certified TRIZ Level 1 Instructor, member of Malaysia TRIZ Innovation Association and Malaysian Institute of Chemistry (IKM). He has been actively conducting seminars on leadership, motivation, team building, and study skills for secondary and undergrad students. His passion for innovation in education led him to become a certified level 1 TRIZ trainer. Since then, he has conducted TRIZ training for students in university level and college level.

Mum Wai Yip is the head of mechanical engineering department at Tunku Abdul Rahman Univeristy College, Malaysia. He graduated with a Diploma in Materials Engineering from Tunku Abdul Rahman College in 1997 and a MSc in Manufacturing Systems Engineering from University of Warwick, United Kingdom in 1998. In 2008, he was awarded an Engineering

Doctorate in Engineering Business Management (specialising in Knowledge Management) from Business Advanced Technology Centre, University Technology Malaysia, Malaysia. He is a certified Knowledge Management Facilitator and Practitioner, a certified TRIZ Practitioner, a Senior Member of International Association of Computer Science and Information (IACSIT) and a member of Malaysia TRIZ Innovation Association. He has presented many papers in the field of engineering management especially in KM in many international conferences in China and Indonesia. He is also a reviewer and an Editorial Board Member for International Journals. Dr. Yip has a lot of experience in research. He has been given a grant by the Ministry of Higher Learning Institution to conduct a research in the implementation of Knowledge Management (KM) in SME in Malaysia.

Nikalus Shu Luing Swee is a program supervisor and a senior lecturer at Tunku Abdul Rahman University College, Penang Branch Campus, Malaysia. He received BSc (Information & Computer Sciences) from National University of Singapore in 1997, and a MBA from Nottingham Trent University, UK in 2001. He is specifically interested in application of TRIZ and also provides TRIZ workshop to tertiary students, university lecturers and industry folks. Mr. Swee is a member of International Association of Computer Science and Information (IACSIT). He is also a member of TRIZ Association of Malaysia. He is a certified TRIZ Level 1 Instructor, Level 1 and II Practitioner. He has received awards from Microsoft (Microsoft Certified Technology Specialist) and IBM (IBM Certified Developer).

See Chew Tai is a program leader at Tunku Abdul Rahman University College, Penang Branch Campus, Malaysia.He holds a degree in Electrical and Electronic and a master in Information Technology. He is a certified TRIZ Level 1 Instructor, Level 1 and II Practitioner, member of Malaysia TRIZ Innovation Association. He conducts TRIZ training for students in university level and college level. He is presently a lecturer with Tunku Abdul Rahman University College.