

E-Policing Systems: The Perspectives of Police Officers and Citizens in a Developed and Developing Nation

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ABSTRACT

A theoretical framework including categories of factors and their associated indicators is derived from previous studies and used to examine e-Policing systems from the perspective of police and citizens in a developed nation (Singapore) compared to a developing nation (Maldives). Data collected by questionnaire from a sample of citizens and police from both nations is used to test hypotheses related to the indicators in the framework. The findings provide insights into e-Policing practices and services provided via social network services (SNS) and location-based services in a developed and a developing nation. Theoretical and practical implications of the findings are discussed.

Keywords: e-Policing, Social Network, Location Service, Police, Citizen

1. INTRODUCTION

Law enforcement services are amenities that facilitate safety, prevention, and maintenance of law and order on a wide scale with the support of the community (Carter, 2009). These organizations are taking advantage of the internet to provide these services using mobile technologies, web applications, instant messaging services, location services, and social network sites (SNS). The most common approach to engaging an online community is e-Policing described by LeBeuf (2006) as a transaction of services and information between the police and citizens via the internet including: online crime reporting; crime maps; real-time statistics; inquiry services; or record-check-services.

In the United States e-Policing has been practiced in some form since 1997 (Police Chief, 2015). The International Association of Chiefs of Police (2014) reported that in the United States: 95 percent of agencies use social media in some capacity; the most common use of social media is for criminal investigations (82.3 percent); the most frequently used social media platforms are Facebook (95.4 percent), Twitter (66.4 percent), and YouTube (38.5 percent); 78.8 percent of agencies report that social media has helped solve crimes in their jurisdiction; and 77.5 percent of agencies state that social media has improved police-community relations in their jurisdiction. LexisNexis (2015) reports that for SNS: 82 percent of law enforcement agencies agree that it is a valuable tool in investigating crimes; for 67 percent it is a valuable tool for anticipating crimes; for 73 percent it helps solve crimes faster; 40 percent use it to monitor special events; and 34 percent use it to notify the public of crimes.

Location-based services are used by many police departments that have adopted SNS to deliver e-Policing services. Location refers to the place where an incident has occurred. Relative location identifies a place relative to other landmarks (e.g. buildings) while absolute location identifies a place using a coordinate system (e.g. GPS coordinates). Location-based services allow police and citizens to share their locations using wireless internet technologies with mobile devices such as smartphones and tablets. Location-based services with mobile devices and integration with SNS have enabled the delivery of e-Policing services such as location reporting, crime activity reporting, crime maps, and crime hotspots. Malleson and Andresen (2014) found that locations reported via SNS can identify more accurately criminal event hotspots and patterns compared to conventional methods (e.g. Geographic Information Systems (GIS)).

Traditional e-Policing services were limited to web pages, web-based services, forums and instant messaging. Advances in internet technologies and the emergence of SNS have influenced agencies to established large online communities in real-time in order to reach more people and deliver services quickly and conveniently. Modern e-Policing practices focus aggressively on utilizing mobile technology, wireless internet, SNS, and location-based services for delivering instantaneous e-Policing services such as crime reporting, crime location tags, seek-for-assistance, and emergency alerts.

E-Policing success depends on many factors such as: proper infrastructure; skills; awareness; availability of technologies; adequate resources; and financial support. Findings from Busagala and Ringo (2013) are typical of the difficulties of introducing e-Policing services in a developing nation. They studied the challenges in introducing e-Policing in Tanzania, which is one of the world's least developed nations (World Bank, 2015), and found: inadequate computer skills; financial constraints; underdeveloped ICT infrastructure; inappropriate selection of police staff to join ICT training; internet access and reliability; and a perception that ICT reduces confidentiality in policing activities. The Asian region has large numbers of internet, SNS, and mobile users and e-Policing

services are available to varying degrees in developed and developing Asian nations. Developed regions such as Hong Kong and Singapore have adopted e-Policing practices successfully. Hong Kong Civil Service Bureau (2015) noted that the Hong Kong police force was able to successfully adopt e-Policing practices to unify services and bring down the overall crime rate by 13.9 percent. Developing countries such as India have used e-Policing to establish and deliver functioning police services online for their citizens. BBC (2006) reported on an e-Policing test case in Bhanegaon Village in the State of Maharashtra in India, where the local police department was engaging with villagers online via the internet. E-Policing services were delivered using video conferencing tools and kiosk machines installed around the districts of 22 villages. The results were astonishing: the number of complaints filed by people per day reduced to only a few from 30 to 40 per day; people in villages were more confident in police services because they could conveniently communicate with the head of the police department via video conference; and the community became more open and transparent when reporting crimes and misconduct of police officers leading to swift service delivery and a reduction in overall crime rates.

With this background, this study addresses three research questions. From the separate and comparative perspectives of police officers and citizens in a developing country and a developed country: **Question 1:** Which factors influence the provision, adoption, and the use of e-Policing practices and services provided using SNS and location-based services? **Question 2:** Among these factors which have a significant influence? **Question 3:** What are the theoretical and practical implications of the findings? The developed nation selected for study is Singapore and the developing nation is Maldives. These nations satisfy the meanings of a developed and a developing nation (World Bank, 2015; World Economic Forum, 2016) and were selected because of the researcher’s experience, knowledge, and professional contacts related to e-Policing in both nations. Citizens and police officers are included in the study as the main stakeholders in the delivery e-Policing services. Among the comparisons made from the findings the main comparisons concern citizens from both nations and separately police from both nations.

The findings are expected to contribute to a better understanding of theoretical relationships among issues related to e-Policing services from the perspectives of police and citizens in the context of a developed developing nation. In addition, the findings are expected to be valuable for police, community groups, and others responsible for the conduct and future development of e-Policing especially in a developing nation.

2. RELATED LITERATURE AND THEORETICAL FRAMEWORK

An overview of related studies is presented first followed by the theoretical framework for the study and the associated hypotheses.

2.1 Overview of Recent Studies

Table 1 characterizes selected previous studies which motivated the development of the theoretical framework for this study. The studies exemplify significant differences in research focus, units of analysis, research approaches, and data collection methods among studies of e-Policing.

Table 1: An overview of previous studies

Project Focus	Unit of Analysis	Research Approach	Data Collection Methods	References
General e-Policing Concepts				
E-Policing in police services, understanding definitions, issues and current experiences	Law enforcement agencies and police services	Descriptive Qualitative	Surveys and interviews	LeBeuf (2006)
The many ways that law enforcement agencies are using the Internet, websites, and other digital techniques to enhance their community policing efforts.	Law enforcement agencies and police services in United States	Exploratory Case-study	Document/Website analysis, interviews with experts, observations and focus group	Cordner and Perkins (2013)
An e-Policing Model for the Ghana Police Service	level of policing and the use of information technology,	Exploratory Case-study	Document analysis and literature reviews	Agbozo (2017)
Examination of a wide range of technological innovations that have applications in the areas of crime prevention generally, and crime control (by police) in particular.	Technological innovations that is applicable to Police in United States	Descriptive Qualitative	Document analysis and literature reviews	Byrne and Marx (2011)
Defining e-policing and smart policing for law enforcement agencies in Gauteng Province	Police services, policing experts and representatives private sector organizations	Exploratory Case-study	literature review and semi-structured interviews	Matlala (2016)
Constraints of e-Policing Adoption in Tanzania.	Police and residents of Dodoma, Tanzania	Explanatory Quantitative	Questionnaires, interviews, focused group discussion and document analysis	Busagala and Ringo (2013)

Perceptions of e-policing and crime mapping.	Seven police force areas in UK.	Quantitative	Telephone interview and focus groups	Ray et al. (2012)
Citizens' perceptions of police service and police response to community concerns.	Citizens in a midwestern city of US	Quantitative	Surveys	Wentz and Schlimgen (2011)
e-Policing with GIS				
GIS for crime analysis: Geography for predictive models.	Crime in Lisbon	Descriptive Quantitative	Statistical and Police crime reports analysis	Ferreira et al. (2012)
Exploring the use of GIS and spatial database of crime characteristics to determine hotspots.	Four types of crime in Dala L.G.A of Kano State, Nigeria	Descriptive Quantitative	ArcGIS version 9.3, Administrative records analysis, document analysis, spatial analysis, field survey and interviews	Ahmed and Salihu (2013)
Developments which have precipitated the use and integration of GIS in policing.	GIS use in South Africa for policing	Historical comparative	Document analysis, literature review and statistics	Breetzke (2008)
The role of crime forecasting in law enforcement operations.	Crime and criminal data of Police Departments in USA	Descriptive Qualitative	Crime Maps, crime data and Hotspot analysis	Perry et al. (2013)
The impact of using social media data in crime rate calculations to determine shifting hot spots and changing spatial patterns.	Crowd-sourced data in Leeds, England,	Descriptive Quantitative	Analysis of Leeds and the census, social media, crime data	Malleson and Andresen (2014)
e-Policing with Social Media				
Social media usage within law enforcement.	Social media use in Victoria Police	Exploratory Qualitative	Social media usage analysis, expert document analysis, interviews and focus groups	Commissioner for Law Enforcement Data Security (2013)
Variation in the usage of Facebook in policing.	Facebook content published by police in United States	Exploratory Quantitative	Latent analysis, reliability analysis, and Facebook usage	Sakiyama et al. (2011)
The current use of social media by the police service in England and Wales.	Social media usage in England and Wales	Exploratory Case-study	Interview, document reviews and social media content analysis	Scholes-Fogg (2012)
Information sharing, law enforcement and community participation.	Information sharing environments of police in southern United States	Case-study	Interviews, surveys and focus groups	Unsworth (2014)
Social media and police leadership.	Lessons from Boston	Descriptive Case-study	Literature reviews and observations	Davis et al. (2014)
Social media and tactical considerations for law enforcement.	Social media in policing from USA, Canada, and UK	Descriptive Case-study	Site visits, interviews, and focus groups	COPS (2013)
Best practices in police social media adaptation.	European police forces adopting social media	Descriptive Qualitative	Composite workshops, events, interviews and Twitter usage	Denef et al. (2012)
Understanding the appropriation of social media by the police.	Social media practices of British police forces during the August 2011 Riots	Descriptive Qualitative	Twitter message reviews, workshops, and interviews	Denef et al. (2013)
Use of Twitter for city police department information sharing.	Police Departments in US cities with populations greater than 300,000	Descriptive Quantitative	Twitter usage (type and number of posts)	Heverin and Zach (2010)
Social media behavior, perceptions, and challenges for police.	Social media usage of Police Departments in India (Delhi, Bangalore, Uttar Pradesh and Chennai)	Quantitative	Social media usage analysis, interviews, and surveys	Sachdeva and Kumaraguru (2014)
Summary of the phenomenon called social media.	Social media platforms and applications	Explanatory	Social media application analysis, literature review, document review	Mayfield (2008)
A comparative study of perceived characteristics and user profiles by social media.	Six main groups of social media-blogs, micro-blogs, social networks, wikis, forums, and content communities-on, users	Quantitative	Web-based survey	Chan-Olmsted et al. (2013)

Police Agency Adoption of Social Media as Related to Agency Size, Community-Oriented Policing, and Technological Capacity	Twitter and Facebook usage	Descriptive Quantitative	Literature review, statistics and survey	Cawley (2016)
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In Table 1 the studies related to *General e-Policing Concepts* focus on determining what e-Policing is about: challenges in adoption; impact; strategies; and public perceptions. Law enforcement agencies and their services is a common unit of analysis. Exploratory case-study approaches are common and data collection methods include interviewing, focus groups, and document analysis. LeBeuf, (2006) is considered a fundamental study focused on almost all major aspects of e-Policing while other studies focused on specific issues.

The *e-Policing with GIS* studies focus on methods to identify, predict, determine, and display crime patterns and hotspots by mapping spatial data with crime data. They emphasize different approaches to adopting GIS in operations and examine crime data as the unit of analysis. Typically, descriptive quantitative approaches are used with data collected by analyzing crime data and statistics. Malleson and Andresen (2014) is an exceptional study compared to the others in this category. It emphasizes using GIS in law enforcement by tapping into various data sources especially social media activity data to determine crime patterns and behavior. This connection between GIS and social media is relevant to this study.

The *e-Policing with Social Media* studies concentrate on adopting social media to enhance operations especially involving communication and community policing. Social media usage and practice is a common unit of analysis among these studies and the research approach is mainly descriptive using social media usage as core data. Some of the studies focused on collecting and analyzing data from specific social media platforms (e.g. Facebook and Twitter). The study by Sakiyama et al. (2011) is very relevant to this study and identifies variables and indicators that are used in the theoretical framework.

2.2 Theoretical Framework

The theoretical framework for the study is displayed in Table 2. It includes 17 factors organized in four categories. These factors have an important influence on the provision, adoption, and the use of e-Policing practices and services provided using SNS and location-based services. Based on referenced studies each factor is defined and decomposed into indicators.

Table 2: Theoretical framework

Category/Factor	Definition	Indicators	References	
Individual Characteristics and Perceptions (ICP)	Personal Characteristics of Individuals	<i>The Individual's</i> : Age, Gender, Nationality, Career Level, Level of Education, Type of Education	Ray et al. (2012), Sachdeva and Kumaraguru (2014), Busagala and Ringo (2013), LeBeuf (2006)	
		<i>Experience</i> : Job Position, Computing Skill Level, Internet Experience	Ray et al. (2012), Sakiyama et al. (2011), LeBeuf (2006)	
		<i>Current location</i> : City of Residence, Country of Residence	Ray et al. (2012), Sachdeva and Kumaraguru (2014), LeBeuf (2006)	
	Social Media & Location Usage	Individual's approach and behavior using social media and sharing location to the public	<i>Social Media Usage</i> : Frequency, Duration, Types of Social Media used	Unsworth (2014), Sachdeva and Kumaraguru (2014), Sakiyama et al. (2011),
			<i>Location Usage</i> : Frequency, Type of Location, Type of Mapping Service Used, Shares Location in Social Media	Ray et al. (2012), Malleson and Andresen (2014)
	Perceptions of Social Media & Location Sharing	Individual's attitude towards social media platforms and sharing location to the public	<i>Ease of Social Media</i> : to communicate, to collaborate, to interact with people, to learn, to share information, to share location	COPS (2013), Sachdeva and Kumaraguru (2014)
			<i>Usefulness of Social Media</i> : to communicate, to collaborate, to interact with people, to share information, to share location	COPS (2013), Ray et al. (2012),
			<i>Impact on individual's</i> : Privacy, Security	Ray et al. (2012), Unsworth (2014)
	Perceptions of Police Service and Level of Engagement	People's opinion about law enforcement services and how they interact with police	<i>Police responsiveness</i> : to community concerns, crime reports, emergencies	Wentz and Schlimgen (2011)
			Police control of crime and disorder	
Satisfaction level with police service			Ray et al. (2012), LeBeuf, (2006), Wentz and Schlimgen (2011)	
<i>Contact with Police</i> : Actual, Perceived			Wentz and Schlimgen (2011)	
Law Enforcement Agency Characteristics and Perceptions (LCP)	Characteristics of Police Departments	<i>The Police Department</i> : Department Name, Types of Policing Practice, Number of Police Officers, Number of Police Stations, Location (City, Country)	LeBeuf (2006), Sakiyama et al. (2011), Busagala and Ringo (2013), Agbozo (2017), Matlala (2016)	
		<i>Have access to</i> : Computers, Smart Phones, Internet, Social Media, GIS, Mapping Application Services, Others	Sakiyama et al. (2011), Agbozo (2017), Matlala (2016)	
		<i>Technology Experience and Use</i> : Computers, Smart Phones, Internet, Social Media, GIS, Mapping Application Services, Others		
	Social Media & Location Usage	Social media and location sharing practices and behavior by police	<i>Social Media Usage</i> : Frequency, Types of Social Media used, Face Restrictions	Sachdeva and Kumaraguru (2014), Sakiyama et al. (2011), Busagala and Ringo (2013), Cawley (2016)
			<i>Location Usage</i> : Frequency, Type of Location, Type of Mapping Service Used, Is GIS Technology used	Ray et al. (2012), Malleson and Andresen (2014), Busagala and Ringo (2013)
	Level of Public Engagement	Physical and online interaction with the public	<i>Frequency of Engagement</i> : Physically, Online, Social Media	Wentz and Schlimgen (2011), Ray et al. (2012), Cawley (2016)
			<i>Responsiveness</i> : to community concerns, crime reports, emergencies	Wentz and Schlimgen (2011), Cordner and Perkins (2013)
	Perceptions of Social Media Usage	Police department's view of social media and location publishing	<i>Ease of Social Media</i> : to communicate, to collaborate, to interact with public, to learn, to share information, to share location	COPS (2013), Sachdeva and Kumaraguru (2014), Cawley (2016)
			<i>Usefulness of Social Media</i> : to communicate, to collaborate, to interact	COPS (2013), Ray et al. (2012), Cawley (2016)

	& Location Sharing		with public, to share information, to share location	
			<i>Challenges or Constraints:</i> Laws, Regulations, Policies	Busagala and Ringo (2013)
	Population, Crime and Criminal Activity Context	Statistics for community, population and crime under jurisdiction of police departments	<i>The Community:</i> Population, Type, Size	Ray et al. (2012), Wentz and Schlimgen (2011)
			<i>Crime and Criminal Context:</i> crime rate, type, response	Wentz and Schlimgen (2011), Agbozo (2017)
Social Media Content, Characteristics, Behavior, and Activities (SCBA)	Social Media Characteristics	Features of social media used by individuals and police	<i>The Social Media:</i> form, user-based, web space, web identity, community-driven, relationships, enable real-time interaction, enables location sharing Number of users	Mayfield (2008), Chan-Olmsted et al. (2013)
	Qualities of Published Content	Features of posts distributed online via social media	<i>The Content:</i> format, type, length	Sakiyama et al. (2011), Chan-Olmsted et al. (2013)
			<i>Classification:</i> category, topic Publisher <i>Shared Link Characteristics:</i> end-point, content type, content relevance to post	Sakiyama et al. (2011)
	Content Responsiveness	Number of responses received for content published online on social media by police or users	<i>Number of:</i> views, likes, comments, shares, re-shares, mentions	
	Significance and Usefulness of Responses	Qualities of information shared by police in perspective of relevance and worth	Attitude of Comments and Responses	Sakiyama et al. (2011), Chan-Olmsted et al. (2013)
			<i>Level of:</i> Relevance, Support, Contribution	Sakiyama et al. (2011), Sachdeva and Kumaraguru (2014)
Followers and Contributor Acquisition	Factors that influences attainment of active support for police on social media	Number of new followers after: a post, share, re-share	Mayfield (2008), Sakiyama et al. (2011), COPS (2013)	
Location Characteristics, Behavior, and Activities (LCBA)	Characteristics and Methods of Location Sharing	Features, attributes , and approaches to sharing location online	<i>The Geolocation:</i> type, road, town, city, region, state, country	Ahmed and Salihu (2013), Breetzke (2008)
			<i>Geocode:</i> latitude, longitude	
			Type of social media used	Malleeson and Andresen (2014), Breetzke (2008)
			Type of computing device used Type of internet connection used	
	Reactions and Responses to Shared Location	Traits of feedback and opinions received for location data	<i>Social Media response, Number of:</i> views, likes, comments, shares, re-shares, mentions	Malleeson and Andresen (2014), Sachdeva and Kumaraguru (2014), Wentz and Schlimgen (2011)
			<i>Police response:</i> time, priority, communication method <i>Public response:</i> type, communication method, time	
Significance, Accuracy, and Usefulness of Location	Level of support and assistance provided with shared location data	<i>Importance of:</i> location shared, information attached, responses to shared location	Ahmed and Salihu (2013)	
		<i>Accuracy of:</i> location shared, information attached, responses to shared location	Ferreira et al. (2012)	

			<i>Usefulness of:</i> location shared, information attached, responses to shared location	Ahmed and Salihu (2013), Ferreira et al. (2012)
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2.3 Research Hypotheses

The indicators in the theoretical framework are associated with an extensive list of 95 research hypotheses which for convenience is presented once in Table 3. The hypotheses were motivated by studies referenced throughout Table 3. All of the hypotheses were tested for the police officers and the citizens except for those in the Law Enforcement Agency Characteristics and Perceptions (LCP) category where only police have the information needed to provide valid and reliable opinions.

3. RESEARCH DESIGN AND METHODOLOGY

This is a cross sectional field study. Quantitative methods are used to analyze data collected with questionnaires in order to test hypotheses associated with a theoretical framework derived from previous studies.

The subjects were police officers and civilians from Singapore and the Maldives with e-Policing experience. They were at least 18 years of age. Based on limited information about the sizes of these four target populations and the need to ensure statistical validity it was decided to select samples of 200 police officers and 300 civilians from both Singapore and Maldives. Because no adequate sampling frames were available a purposive method was used (Neuman, 2006). Participants were accessed through personal contacts in the police forces in both nations and the use of social media. Sampling was done in stages making initial contacts and then asking them to identify suitable others. Questionnaires were available in hard and soft copy. A cover letter introduced the purpose of the study, instructions for its completion and return, and a contact for additional information.

A separate questionnaire in the English language was designed for police officers and civilians. Section 1 in each questionnaire addressed personal and work characteristics and adopted technologies (Appendix A1). Section 2 presented the statements associated with the 95 hypotheses (Table 3) with measurement scales for responses. Questionnaires were reviewed by a focus group of five individuals with expertise in e-Policing and suggested modifications were included in revised versions of the questionnaires which were then administered in pilot studies with 10 suitable subjects. Modifications were included in the final versions of the questionnaires.

The data from section 1 was analyzed using frequency distributions. The hypotheses in section 2 were tested using one of two approaches:

(a) Many hypotheses required a response to a single statement on a 7-point Likert scale. The hypothesis was supported only if a t-test showed that the mean of the responses was statistically significantly different from the *neutral* value of 4 ($p < 0.05$) for a non-directional hypothesis or in the direction specified for a directional hypothesis;

(b) Other hypotheses required the comparison of the means of responses to two statements each on 7-point Likert scales. The hypothesis was supported only if a t-test showed that the difference between the means was statistically significantly different from zero ($p < 0.05$) for a non-directional hypothesis or in the direction specified for a directional hypothesis.

Seven-point scales were used in order to provide subjects with an appropriate way of expressing their opinions.

4. DATA ANALYSES AND HYPOTHESIS TESTING

This section presents the results of the data analyses. The interpretation and discussion of the results is presented in section 5.

4.1 Data Entry and Preparation

After a considerable effort it was possible to obtain a sample of 200 police from Singapore and 114 from Maldives and 302 citizens from Singapore and 220 from Maldives. Although these sample sizes were less than planned they were considered to be satisfactory. The data was entered into an SPSS worksheet. Ten percent of the questionnaires in each of the four groups were selected at random and checked for data entry errors. None were found. There were no outliers or missing values.

4.2 Descriptive Analyses

Data collected in section 1 of the questionnaires was analyzed to develop profiles of the two groups of police and citizens. The results are in Appendix Tables A1, A2, and A3. Means, standard deviations, skewness, and kurtosis were calculated for the variables associated with the hypotheses in section 2. These are not shown but based on the standard deviations which were less than 1.911 it was concluded that responses were consistent and the means were appropriate representations of the values of the variables. The skewness and kurtosis for the distributions of the variables were within limits of 3 and 7, respectively, which justified the use of the t-tests used for hypothesis testing (Ott and Hildebrand, 1983).

4.3 Hypothesis Testing

Table 3 presents the decisions for each of the 95 hypotheses. The decision is supported (S) or not supported (NS) and in some cases comments are p. Groups of hypotheses are preceded by references to studies which motivated those hypotheses.

Table 3: Decisions for hypotheses

Hypothesis: Individual Characteristics and Perceptions (ICP)				
<i>References:</i> Ray et al. (2012), Sachdeva and Kumaraguru (2014), LeBeuf (2006).	Citizens		Police	
	Singapore	Maldives	Singapore	Maldives
ICP 1(a) Compared to people aged 35 years or more people aged 18-35 years:				
(i) Engage with Police online significantly more often.	NS <i>Comment</i>	S	S	S
(ii) Are significantly more aware of online Police presence.	NS	S	NS	S
ICP 1(b) Compared to other people those with:				
(i) Computer and internet experience engage with Police online significantly more often.	S	S	S	S
(ii) SNS knowledge and experience find it significantly easy to share information and location with Police using SNS.	S	S	S	S
ICP 1(c) People strongly prefer to engage online with Police organizations which are situated in the same location as them.	S	NS	S	S
ICP 1(d) The use of online engagement with Police is significantly greater for males than for females.	NS	S	NS	NS
<i>Comment: People aged 35 years or more engage with Police online significantly more often than people aged 18-35 years.</i>				
<i>References:</i> Unsworth (2014), Sachdeva and Kumaraguru (2014), Sakiyama et al. (2011), Ray et al. (2012), Malleson and Andresen (2014), COPS (2013).				
ICP 2(a) Compared to other means of online communication with Police SNS are:				
(i) Used significantly more often.	S	NS	S	S
(ii) Used for significantly longer periods of time.	S	NS	S	S
(iii) Significantly less complex to use.	S	S	S	S
(iv) Significantly more useful.	S	S	S	S
ICP 2(b) People are not willing to specify their location when they are using SNS to engage with Police	S	S	S	S
ICP 2(c) Compared to offline communication methods between Police and the public using SNS:				
(i) Requires significantly less time and effort.	S	NS	S	S
(ii) For reporting locations to Police is significantly more accurate.	S	S	S	S
ICP 2(d) The usefulness of SNS is significantly different when used to interact with Police online compared its use to interact with other people online.	S <i>Comment</i>	S <i>Comment</i>	NS	NS
ICP 2(e) The level of assurance of privacy and security when using SNS to communicate with Police online:				
(i) Is significantly different compared to the use of other online and offline methods of communication?	S	NS	S	S
(ii) Has a significant effect on how often SNS are used for this purpose.	S	S	S	S
<i>Comment: SNS is significantly more useful for interacting with other people online than it is for interacting with Police online.</i>				
<i>References:</i> Wentz and Schlinggen (2011), Ray et al. (2012), LeBeuf, (2006).				
ICP 3(a) Police response rates for community concerns, crimes, and emergencies which are reported offline are significantly different from response rates for community concerns, crimes, and emergencies which are reported online.	NS	S <i>Comment 1</i>	S <i>Comment 2</i>	NS
ICP 3(b) Police control rates of crimes and disorder which are reported offline are significantly different from control rates for crimes and disorder which are reported online	NS	S <i>Comment 3</i>	NS	NS
ICP 3(c) The level of satisfaction with Police services is significantly different for people who engage with Police online compared to those who engage with Police offline.	NS	NS	NS	NS
ICP 3(d) People who engage with Police:				

(i) Offline have a significant preference for real physical contact with Police.	S	S	S	S
(ii) Online have a significant preference for virtual contact with Police.	S	S	S	S
ICP 3(e) People engage with Police using SNS significantly more often than they engage with Police using:				
(i) Other online methods.	S	NS	S	S
(ii) Real physical contact.	NS	S	NS	NS
<i>Comment 1: Police response rates for community concerns, crimes, and emergencies which are reported offline are significantly better than response rates for community concerns, crimes, and emergencies which are reported online.</i>				
<i>Comment 2: Police response rates for community concerns, crimes, and emergencies which are reported online are significantly better than response rates for community concerns, crimes, and emergencies which are reported offline.</i>				
<i>Comment 3: Police control rates of crimes and disorder which are reported offline are significantly better than control rates for crimes and disorder which are reported online.</i>				

Table 3: Decisions for hypotheses (continued)

Hypothesis: Law Enforcement Agency Characteristics and Perceptions (LCP)		
<i>References:</i> LeBeuf (2006), Sakiyama et al. (2011), Busagala and Ringo (2013), Sachdeva and Kumaraguru (2014), Malleson and Andresen (2014), Ray et al. (2012), COPS (2013), Agbozo (2017), Matlala (2016).	Police	
	Singapore	Maldives
LCP 1(a) There is a significant difference among Police Departments with 50-500 officers, 500-1000 officers, and over 1000 officers with respect to:		
(i) Technology awareness.	NS	S <i>Comment 2</i>
(ii) Internet use.	NS	S <i>Comment 2</i>
(iii) SNS use for police operations.	NS	S <i>Comment 2</i>
(iv) SNS use for publishing location.	NS	S <i>Comment 2</i>
(v) The use of GIS for crime mapping and hotspot identification.	NS	S <i>Comment 2</i>
(vi) The use of Mapping Applications.	NS	S
(vii) Challenges and restrictions on the use of SNS for Police operations and public engagement.	NS	S <i>Comment 3</i>
(viii) The level of privacy and security assurance for shared information.	S <i>Comment 1</i>	S <i>Comment 2</i>
LCP 1(b) For Police Departments in:		
(i) Remote and rural areas access to the internet and computers is significantly limited.	S	S
(ii) Developing countries compared to those in developed countries technology usage and experience related to Police operations is significantly different.	S	S
<i>Comment 1: With respect to the level of privacy and security assurance for shared information Police Departments with 50-500 officers are not significantly different from Police Departments with 500-1000 officers, but in both cases the level of privacy and security assurance for shared information is significantly greater than in Police Departments with over 1000 officers.</i>		
<i>Comment 2: With respect to: Technology awareness, Internet use, SNS use for police operations, SNS use for publishing location, the use of GIS for crime mapping and hotspot identification, the use of Mapping Applications, and the level of privacy and security assurance for shared information Police Departments with 50-500 officers are significantly more involved than Police Departments with 500-1000 officers which are significantly more involved than Police Departments with over 1000 officers.</i>		
<i>Comment 3: With respect to challenges and restrictions on the use of SNS for Police operations and public engagement Police Departments with 50-500 officers are not significantly different from Police Departments with 500-1000 officers, but in both cases challenges and restrictions on the use of SNS for Police operations and public</i>		

<i>engagement is significantly greater than in Police Departments with over 1000 officers.</i>		
References: Wentz and Schlimgen (2011), Cordner and Perkins (2013), Cawley (2016).		
LCP 2(a) The frequency of engagement with the public is significantly different for Police Departments which interact with the public using face-to-face means and those which use SNS and other online means.	NS	NS
LCP 2(b) Police Departments which:		
(i) Physically interact with the public are highly responsive to crime reports and emergencies.	S	S
(ii) Interact with the public using SNS are highly responsive to community concerns.	S	S
LCP 2(c) The frequency of engagement with the public has a significant effect on Police response time to community concerns, crime reports, and emergencies.	S	S
LCP 2(d) Police who engage with the public using SNS are significantly less responsive to crime reports and emergencies compared to Police who engage with the public using other means.	S	S
References: COPS (2013), Sachdeva and Kumaraguru (2014), Ray et al. (2012), Busagala and Ringo (2013), Cawley (2016).		
LCP 3(a) For operational communication and collaboration among Police and Police Departments SNS are significantly:		
(i) Easy to use.	S	S
(ii) Useful.	S	S
LCP 3(b) In Police Departments with technical and internet experience the information and location sharing function in SNS is significantly:		
(i) Easy to use.	S	S
(ii) Useful.	S	S
LCP 3(c) Strict internet usage laws, regulations, and policies significantly:		
(i) Reduce significantly the use of SNS in Police Departments.	S	S
(ii) Provide significantly higher levels of privacy, security, and discretion for information shared by the public.	S	S
LCP 3(d) In Police Departments in developing and developed countries:		
(i) The level of privacy and security of information shared with the public online is significantly different.	S	S
(ii) Limited Internet knowledge and SNS experience significantly impacts the acceptance and adoption of SNS in Police operations.	S	S
LCP 3(e) The use of SNS to interact with the public significantly increases the number of Police engaging with citizens in their community.	S	S
References: Cordner and Perkins (2013), Wentz and Schlimgen (2011), Cawley (2016).		
LCP 4(a) The use of SNS and GIS:		
(i) In Police operations is significantly greater for Police Departments in densely populated communities than it is in less densely populated communities.	NS	NS
(ii) In Police operations increases significantly as the rate of serious crime increases.	S	S
(iii) Increases significantly the responsiveness of Police Departments in dealing with community concerns, crime reports, and emergencies.	S	S

Table 3: Decisions for hypotheses (continued)

Hypothesis: Social Media Content, Characteristics, Behavior, and Activities (SCBA)				
References: Mayfield (2008), Chan-Olmsted et al. (2013).	Citizens		Police	
	Singapore	Maldives	Singapore	Maldives
SCBA 1(a) The public and Police have a significant preference for SNS that:				
(i) Are community and relationship driven.	S	S	S	S
(ii) Are focused on building community relationships.	S	S	S	S
(iii) Enable real-time interaction and location sharing.	S	NS	S	S
(iv) Have over 1 million users.	S	NS	S	S
(v) Provide the capability to create a personal user profile.	S	NS	S	S
References: Sakiyama et al. (2011), Chan-Olmsted et al. (2013).				

SCBA 2(a) Text content published on SNS by:				
(i) The public is usually short and expressive.	S	NS	S	S
(ii) Police Departments is usually very long and detailed.	S	S	S	S
(iii) The public and Police Departments is significantly more common than multimedia content.	S	NS	S	S
SCBA 2(b) Compared to the content published by Police Departments on SNS the content published by the public:				
(i) Is significantly more.	S	NS	NS	NS
(ii) Includes categories/topics that are significantly less meaningful and detailed.	S	NS	NS	NS
(iii) Includes significantly less web page links (hyperlinks).	NS	NS	NS	NS
SCBA 2(c) Web page links (hyperlinks) included in SNS messages/posts:				
(i) By Police are significantly relevant to the published messages/posts.	S	NS	S	S
(ii) By the public contain significantly more text content than multimedia content.	S	S	S	S
(iii) By Police contain significantly more text content than multimedia content.	S	S	S	S
(iv) By Police usually point to web pages and content of a Police Department's website.	S	S	S	S
Reference: Sakiyama et al. (2011).				
SCBA 3(a) Content published by Police Departments using SNS:				
(i) Has a significantly high rate of response from the public compared to content published using offline methods.	S	S	S	S
(ii) Attracts a significantly larger audience compared to content shared using other online methods.	S	S	S	S
(iii) Has a significantly higher rate of sharing and re-sharing among the public compared to content published by other methods.	S	S	S	S
SCBA 3(b) The rate of responses:				
(i) From the public to content published by Police Departments on SNS increases as the richness of the content increases.	S	S	S	S
(ii) By Police Departments to people's reactions and comments to their messages/posts on SNS is usually less than the public expects.	S	NS <i>Comment</i>	S	S
(iii) To content published and shared by Police Departments on SNS is highest among people who frequently engage with the police on SNS.	S	NS	S	S
Comment: The rate of responses by Police Departments to people's reactions and comments to their messages/posts on SNS is usually significantly greater than the public expects.				
References: Sakiyama et al. (2011), Chan-Olmsted et al. (2013), Sachdeva and Kumaraguru (2014).				
SCBA 4(a) Responses to content published by Police Departments on SNS from:				
(i) The public are usually very relevant to the content.	S	NS	S	S
(ii) People who do not regularly engage with the police on SNS are usually neutral or negative.	S	NS	S	S
(iii) People who regularly engage with the police via SNS are usually positive.	S	S	S	S
(iv) The public which are mainly negative have a negative effect on the level of support for the content and the number of contributions related to the content.	S	S	S	S
(v) The public which are mainly neutral or positive have a positive effect on the level of support for the content and the number of contributions related to the content.	S	S	S	S
References: Mayfield (2008), Sakiyama et al. (2011), COPS (2013).				
SCBA 5(a) The number of new followers of Police Departments on SNS is increased significantly if:				
(i) The posting of rich content is routine and regular.	S	S	S	S
(ii) The content can be shared and re-shared.	S	S	S	S

Table 3: Decisions for hypotheses (continued)

Hypothesis: Location Characteristics, Behavior, and Activities (LCBA)

<i>References:</i> Ahmed and Salihu (2013), Breetzke (2008).	Citizens		Police	
	Singapore	Maldives	Singapore	Maldives
LCBA 1(a) People who interact with Police using SNS:				
(i) Share or publish location information significantly less often than Police Departments.	NS	NS <i>Comment 1</i>	NS	S
(ii) Share relative locations significantly more often than Police Departments.	NS	NS	NS	NS
(iii) Share absolute locations in SNS significantly less often than Police Departments.	NS	NS	NS	NS
(iv) Share or publish location information using Smartphones with Mobile Data Internet connectivity significantly more than Police Departments.	NS	S	NS	NS
(v) Share or publish location information using computers with broadband Internet connectivity significantly less than Police Departments.	NS	NS <i>Comment 2</i>	S	NS
<i>Comment 1: People who interact with Police using SNS share or publish location information significantly more often than Police Departments.</i>				
<i>Comment 2: People who interact with Police using SNS share or publish location information using computers with broadband Internet connectivity significantly more than Police Departments.</i>				
<i>References:</i> Malleson and Andresen (2014), Sachdeva and Kumaraguru (2014), Wentz and Schlimgen (2011).				
LCBA 2(a) Locations published with rich information in SNS produce significantly high responses from the public and Police.	S	S	S	S
LCBA 2(b) Relative location information shared by the public using SNS significantly increases the response time of Police.	S	NS	S	S
LCBA 2(c) Response times to relative location information compared to response times to absolute location information are significantly different:				
(i) For members of the public if the information is provided by Police using SNS.	NS	NS	NS	S <i>Comment 1</i>
(ii) For Police if the information is provided by the public using SNS.	NS	S <i>Comment 2</i>	S <i>Comment 2</i>	NS
LCBA 2(d) The priority that Police give to a response is significantly different for absolute and relative locations shared by the public via SNS.	NS	NS	NS	NS
<i>Comment 1: Response times to relative location information compared to response times to absolute location information are significantly lower for members of the public if the information is provided by Police using SNS.</i>				
<i>Comment 2: Response times to relative location information compared to response times to absolute location information are significantly greater for Police if the information is provided by the public using SNS.</i>				
<i>References:</i> Ahmed and Salihu (2013), Ferreira et al. (2012), Malleson and Andresen (2014), Sachdeva and Kumaraguru (2014), Wentz and Schlimgen (2011).				
LCBA 3(a) Location information shared using SNS:				
(i) Produces a significant response rate from the Police.	S	NS	S	S
(ii) Produces a significant response rate from the public.	S	NS	S	S
(iii) Produces significantly different response rates from the Police and the public.	NS	NS	NS	S <i>Comment</i>
(iv) Results in different methods for communicating responses from the Police and the public.	S	S	S	S
(v) Is significantly useful for Police Departments.	S	S	S	S
(vi) Is significantly useful for the public.	S	S	S	S
LCBA 3(b) The accuracy and reliability of location information shared by Police Departments using SNS is significantly better than the accuracy and reliability of location information shared by the public.	NS	S	NS	NS
<i>Comment: Location information shared using SNS produces a significantly lower response rate from the Police than the public.</i>				

Table 4 is derived from Table 3 and shows the distributions of the hypotheses that were supported by citizens and police from each nation and the distributions of hypotheses where the decisions were the same for the police and citizens from each nation.

Table 4: Distributions of hypotheses supported and decisions the same

Category	Factor	Number of Hypotheses	Singapore					Maldives					Percent of Hypotheses with the Same Decision		
			Police		Citizens		Percent of Hypotheses with the Same Decision	Police		Citizens		Percent of Hypotheses with the Same Decision	All Police	All Citizens	
			Number Supported	Percent Supported	Number Supported	Percent Supported		Number Supported	Percent Supported	Number Supported	Percent Supported				
Individual Characteristics and Perceptions (ICP)	Personal characteristics of individuals	6	4	67	3	50	83	5	83	5	83	67	83	33	
	Social media and location usage and its perception	10	9	90	10	100	90	9	90	6	60	50	100	60	
	Perceptions of police service and level of engagement	7	3	43	2	29	86	2	29	6	86	43	86	43	
	<i>For Category</i>	23	16	70	15	65	87	16	70	17	74	52	91	48	
Social Media Content Characteristics, Behavior and Activities (SCBA)	Social media characteristics	5	5	100	5	100	100	5	100	2	40	40	100	40	
	Qualities of published content	10	7	70	9	90	80	7	70	4	40	70	100	50	
	Content responsiveness	6	6	100	6	100	100	6	100	4	67	67	100	67	
	Significance and usefulness of responses	5	5	100	5	100	100	5	100	3	60	60	100	60	
	Followers and contributor acquisition	2	2	100	2	100	100	2	100	2	100	100	100	100	
	<i>For Category</i>	28	25	89	27	96	93	25	89	15	54	64	100	57	
Location Characteristics, Behavior and Activities (LCBA)	Characteristics and methods of location sharing	5	1	20	0	0	80	1	20	1	20	60	60	80	
	Reactions and responses of shared location	5	3	60	2	40	80	3	60	2	40	40	60	60	
	Significance, accuracy and usefulness of location	7	5	71	5	71	100	6	86	4	57	43	86	57	
	<i>For Category</i>	17	9	53	7	41	88	10	59	7	41	47	71	65	
Law Enforcement Agency Characteristics and Perceptions (LCP)	Characteristics of police departments and their social media and location usage	10	3	30	LCP hypotheses were tested only for police.				10	100	LCP hypotheses were tested only for police.			30	LCP hypotheses were tested only for police.
	Level of public engagement	5	4	80					4	80				100	
	Perceptions of social media usage and location sharing	9	9	100					9	100				100	
	Population, crime and criminal activity context	3	2	67					2	67				100	
	<i>For Category</i>	27	18	67					25	93				100	

	<i>For all Categories</i>	95	68	72	49	72	90	76	80	39	57	56	85	56
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Note: For citizens percentages are based on 68 hypotheses in the first three categories and for police the percentages are based on 95 hypotheses in all categories.

The results from this section 4 are discussed in the following section 5.

5. DISCUSSION OF THE FINDINGS

This section has been structured to minimize duplication of comparisons among the decisions for the hypotheses among the four groups. The discussion begins with a profile of the citizens and police from both nations (section 5.1). This is followed by discussion of the distributions of the decisions for the hypotheses in Table 3 (section 5.2). Next, the degrees of agreement among the four groups are discussed (section 5.3). Police from both nations are compared for hypotheses in the LCB category (section 5.4). Practical implications of the findings are presented in section 5.5.

5.1 Profiles of Respondents

The discussion is based on the results presented in Tables A1, A2, and A3.

Citizens from Singapore and Maldives: The number of responses from citizens is greater for Singapore than Maldives where it was more difficult to obtain responses. Even though there are more males than females from both nations the difference is greater in Maldives where normally females are hesitant to participate in surveys. The age distributions of citizens from both nations are similar. The mean age of citizens from Singapore is 33 years compared to 34 years for Maldives. The majority from Singapore is in the 32-38 years age range and the majority from Maldives is 25-32 years of age. In both nations about 90 percent of the respondents are less than 45 years of age and only 3 percent are 53 years or older. It is expected that these younger citizens have more familiarity, knowledge, and understanding of internet technologies and e-Policing compared to older citizens. The majority from both countries has completed a High School Diploma or equivalent. However, 90 percent of participants from Singapore hold an associate degree or less compared to 60 percent from Maldives. Eleven percent of respondents from Maldives hold a master of doctoral level degree while the proportion is only 2 percent for Singapore. Sampling procedures probably explain the higher levels of education among citizens from Maldives where university students were more willing to participate. On average, the citizens from Singapore have 4 years experience with e-Policing compared to 3 years for Maldives. In particular, 41 percent from Maldives have one year or less experience while the corresponding proportion for Singapore is 27 percent. Compared to Singapore e-Policing is relatively new for citizens in Maldives.

The majority from both nations use Google mapping services with a larger proportion in Maldives (78 percent) compared to Singapore (67 percent). The use of Bing is low in both the countries but it is more popular in Singapore (17 percent) than Maldives (9 percent). In both nations Google has greater reach than any other mapping service. However, there are more citizens from Singapore (16 percent) with no experience of mapping services compared to Maldives (11 percent). The majority of respondents from both nations (61-63 percent) use Facebook for specifying location information with e-Policing platforms followed by Twitter (22-23 percent). However, there are 13-16 percent of citizens from both nations who have no experience with the use of SNS platforms in e-Policing. In accordance with Groarke (2014) most citizens in both nations (43-51 percent) use smartphones with internet connectivity for sharing/publishing location information in e-Policing platforms while 30-36 percent uses computers for this task. Surprisingly, 19-21 percent of citizens in both nations have no experience using these technologies with e-Policing platforms.

Police from Singapore and Maldives: There are more male than female police respondents from both nations but the difference is greater among respondents from Maldives (76 percent males). According to The Indian Express (2015) Maldives is one of four countries with the lowest representation of female police officers (7 percent). Most of the police officers in both nations are in the age range 32-38 years. The mean age of police officers is 37 years in Singapore and 35 years in Maldives. Most of the police from both nations (81-89 percent) are 25-45 years of age. The majority of police from Singapore has an Associate Degree (44 percent) while the majority from Maldives (61 percent) has only a High School Diploma or equivalent. The lower level of education among police from Maldives is due to admittance into the police academy directly from High School. There are very few graduate level educated police from both nations which reflects a lack of opportunity to pursue graduate level education in both police forces. Globally, most police forces concentrate on professional skills rather than academic degrees. On average, the police from both nations have five years experience with e-Policing. However, the majority from Maldives (47 percent) has five or more years experience with e-Policing compared to the majority from Singapore (59 percent) with only 2-4 years experience.

The mean number of years of service among police from Singapore was 4 years and from Maldives was 9 years. The majority from Maldives (40 percent) has 6-10 years of service compared to the majority from Singapore (59 percent) with 3-5 years. Compared to Singapore Maldives is a smaller country with a smaller turnover among police officers which creates less demand for new officers and so police tend to have more years of service. Most of the police respondents from Singapore were from special operations positions (28 percent) followed by general administration (20 percent) and investigation (19 percent). For Maldives the three most common positions are: investigation (17 percent); public affairs (16 percent); and special operations (12 percent). The majority of police from Singapore were located in districts (61 percent) while in Maldives most police (71 percent) were located in cities. In both nations smaller proportions (11-15 percent) were located in provinces. During the survey it was difficult to get responses from provinces due to the wide geographical boundaries and the challenges in approaching police officers situated in distant departments. In Singapore the size of most departments (69 percent) was 500-1000 police officers. In Maldives the size of most departments (79 percent) was 50-499 police officers. In both nations only 7-9 percent of officers were from departments with more than 1000 officers. The large difference in department manpower is self-explanatory. The size of departments is adjusted based on the population of the community served. The population of Singapore communities vastly outnumbers those in Maldives, which explains why Singapore police departments require more man-power.

In both nations Google is used by the largest number of police (82-85 percent). In Singapore, there were no officers without experience with mapping services but in Maldives 9 percent had no experience with mapping services. In Maldives the number of

older non-internet savvy police is high and the older officers are reluctant to use technology. In both nations Bing and other types of mapping services are not used frequently to share location in e-Policing platforms. The majority of police respondents from both nations (74-83 percent) use Facebook followed by Twitter (15-19 percent). In Singapore the use of computers and smartphones with broadband internet connectivity to share/publish location were equally the most popular among 99 percent of police. For Maldives the use of computers (52 percent) was ahead of the use of smartphones (40 percent). For Maldives rules, regulations, and policies restrict officers from using their smartphones in their work. However, in Singapore there is a more flexible policy for using smartphones. There are very few police from either nation (1-7 percent) who have no experience using devices and internet technologies with e-Policing platforms.

5.2 Distributions of Decisions for Hypotheses

From Table 4 it is seen that for:

Citizens and Police from Singapore agree about decisions for 90 percent of the hypotheses. The highest level of agreement is among hypotheses in the SCBA category (93 percent) followed by the LCBA category (88 percent) and the ICP category (87 percent). For both citizens and police 72 percent of the hypotheses were supported. For citizens the strongest support was for hypotheses in the SCBA category (96 percent) followed by the ICP category (65 percent) and the LCBA category (41 percent). For police the strongest support was for hypotheses in the SCBA category (89 percent) followed by the ICP category (70 percent), the LCP category (67 percent), and the LCBA category (53 percent);

Citizens and Police from Maldives agree about decisions for 56 percent of the hypotheses. The highest level of agreement is among hypotheses in the SCBA category (64 percent) followed by the ICP category (52 percent) and the LCBA category (47 percent). For citizens 57 percent of the hypotheses were supported with strongest support for hypotheses in the ICP category (74 percent) followed by the SCBA category (54 percent) and the LCBA category (41 percent). For police there was support for 80 percent of the hypotheses with strongest support for hypotheses in the LCP category (93 percent) followed by SCBA category (89 percent), the ICP category (70 percent), and the LCBA category (59 percent);

Police from Singapore and Maldives agree about decisions for 85 percent of the hypotheses. There is 100 percent agreement for hypotheses in the SCBA category followed by the ICP category (74 percent), and the LCBA category (71 percent);

Citizens from Singapore and Maldives agree about decisions for 56 percent of the hypotheses. The agreement is strongest in the LCBA category (65 percent) followed by the SCBA category (57 percent), and the ICP category (48 percent).

In summary, the overall level of agreement between police and citizens about decisions for hypotheses is much higher in Singapore (90 percent) than in Maldives (56 percent) and this is true in each category. The overall level of agreement between police from both nations and citizens from both nations about decisions for hypotheses is much higher for police (85 percent) than for citizens (56 percent). There is close agreement between the citizens from Singapore, the police from Singapore, and the police from Maldives, while citizens from Maldives express different opinions.

5.3 Degrees of Agreement among the Groups

The discussion considers hypotheses in Table 3 where there was agreement about decisions for hypotheses in the ICP, SCBA, and LCBA categories among: (a) all four groups; (b) three of the four groups; (c) two of the four groups.

5.3.1 Agreement among Each of the Four Groups

There was agreement among the four groups about decisions for: 43 percent of the hypotheses in the ICP category; 57 percent in the SCBA category; and 41 percent in the LCBA category. These areas of full agreement among the groups are described for each category.

Individual Characteristics and Perceptions (ICP): People with computer and internet experience engage with Police online more often than others. Those with SNS knowledge and experience find it easy to use SNS to share information and location with police. SNS are useful, easy to use, and more accurate for reporting locations to police compared to offline communication methods. However, people are reluctant to specify their location when they are using SNS to engage with police and the level of assurance of privacy and security has a significant effect on how often SNS are used to engage with police.

The level of satisfaction with police services is not significantly different for people who engage with police online compared to those who engage with police offline. People who engage with police offline (online) prefer physical (virtual) contact with police.

Social Media Content, Characteristics, Behavior, and Activities (SCBA): The public and police have a strong preference for SNS that are based on and driven by community relationships. If the posting of rich content on SNS is routine and regular and it can be shared and re-shared then the number of followers of police departments and the response rates to content published by the police increase significantly. On SNS the text content published by police is usually very long and detailed while the content published by the public does not include significantly less web page links. Links used in SNS messages/posts by the public and police contain much more text than multimedia content and for police usually point to web pages and content at a police website.

Content published by police using SNS: has as a much higher response rate from the public than content published offline; attracts a larger audience compared to content shared using other online methods; and has a higher rate of sharing and re-sharing among the public compared to content published by other methods. Responses to content published by police on SNS from people who engage regularly with the police via SNS are usually positive. Negative responses from the public have a negative effect on the level of support for the content and the number of contributions related to the content. However, neutral or positive responses have a positive effect on the level of support and the number of contributions.

Location Characteristics, Behavior, and Activities (LCBA): People who interact with police using SNS do not share relative or absolute locations more or less often than police. Locations published with rich information on SNS produce much high responses from the public and the police. The priority that police give to a response is not significantly different for absolute and relative locations shared by the public. Location information shared using SNS is very useful for police and the public and results in the use of different methods for communicating responses from the police and the public.

5.3.2 Agreement among Three of the Four Groups

There was agreement among three of the four groups about decisions for: 39 percent of hypotheses in the ICP category; 43 percent in the SCBA category; and 53 percent in the LCBA category.

Individual Characteristics and Perceptions (ICP): Only citizens from Singapore believe that people older than 35 years engage more often with police online.

For the following statements there was agreement among all of the groups except for the citizens from Maldives. People prefer to engage online with police organizations which are situated in the same location as them. There is no difference between males and females with respect to online engagement with police. Compared to other means of online communication with police SNS are used more often and for much longer periods of time. However, people do not engage with police using SNS significantly more often than they do by making physical contact. Compared to offline communication methods between police and the public using SNS requires much less time and effort. The level of assurance of privacy and security when using SNS to communicate with police is significantly improved compared to the use of other online and offline methods of communication.

There is no difference between police control rates for crimes and disorder reported online or offline. However, citizens from Maldives consider the control rates to be better when the reporting is offline.

Social Media Content, Characteristics, Behavior, and Activities (SCBA): Only citizens from Singapore agree that compared to the content published by police on SNS much more is published by the public but it includes topics that are significantly less meaningful and detailed.

For all of the following statements there was agreement among all of the groups except for citizens from Maldives. The public and police have a significant preference for SNS that: enable real-time interaction and location sharing; involve over 1 million users; and enable the creation of a personal user profile. Text content is significantly more common than multimedia content in publications by the public and the police on SNS. The content published by the public is usually short and expressive. Web page links included in SNS messages/posts by police are very relevant. The response rate by police to people's reactions to and comments on their messages/posts on SNS are usually less than what the public expects. The response rate to content published and shared by police on SNS is highest among people who frequently engage with the police using SNS. Public responses to content published by police on SNS are usually very relevant to the content. Responses from people who do not engage regularly with the police on SNS are usually neutral or negative.

Location Characteristics, Behavior, and Activities (LCBA): Only police from Maldives support the following statements. People who interact with police using SNS share/publish location information significantly less often than police. Response times by the public to relative location information compared to absolute location information are significantly different for information provided by police using SNS. Location information shared using SNS produces a significantly lower response rate from the police than the public.

Only the citizens from Maldives support the following statements. Location information shared using SNS does not produce a significant response rate from the police and the public. Relative location information shared by the public using SNS does not significantly increase the response time of police. People who interact with police using SNS share or publish location information using smartphones with mobile data internet connectivity much more than police.

Only police from Singapore agree that people who interact with police using SNS share/publish location information using computers with broadband Internet connectivity much less than police.

5.3.3 Agreement among Two of the Four Groups

There was agreement among two of the four groups about decisions for: 13 percent of hypotheses in the ICP category; and only 4 percent of hypotheses in the SCBA category.

Individual Characteristics and Perceptions (ICP): Only citizens and police from Maldives agree that compared to older people those aged 18-35 years are significantly more aware of online police presence. Only citizens from Maldives and Singapore believe that SNS is significantly more useful for interacting with other people than it is for interacting with police online but police believe that there is no difference. Only citizens from Maldives and police from Singapore believe that police response rates are different for offline and online reporting of community concerns, crimes, and emergencies. The citizens from Maldives believe response rates are better for offline reporting and police from Singapore believe that response rates are better for online reporting.

Social Media Content, Characteristics, Behavior, and Activities (SCBA): Only citizens from Maldives and police from Singapore believe that police response times to relative location information are greater than for absolute location information if the information is provided by the public using SNS. Police from Maldives and citizens from Singapore believe that there is no difference in the response times.

5.4 Comparison of Police from both Nations for the LCP Category

Only police were asked to respond to issues in the Law Enforcement Agency Characteristics and Perceptions (LCP) category. The police from both nations agree on the following statements. For police departments in remote and rural areas access to the internet and

computers is significantly limited. In police departments in developing and developed countries there is a significant difference in technology usage and experience related to police operations and the level of privacy and security of information shared with the public online. Also, limited internet knowledge and SNS experience significantly impacts the acceptance and adoption of SNS in police operations.

The frequency of engagement with the public is not significantly different for police using face-to-face means and those using SNS and other online means. Police departments which interact physically with the public are highly responsive to crime reports and emergencies. Police who engage with the public using SNS are less responsive to crime reports and emergencies compared to those who engage with the public using other means but they are highly responsive to community concerns. The frequency of engagement with the public has a significant effect on police response times to community concerns, crime reports, and emergencies.

For operational communication and collaboration among police SNS are very useful and easy to use. For police with technical and internet experience the information and location sharing function in SNS is very useful and easy to use. The use of SNS to interact with the public significantly increases the number of police engaging with citizens in their community. Strict internet usage laws, regulations, and policies reduce the use of SNS by police but provide higher levels of privacy, security, and discretion for information shared by the public. The use of SNS and GIS in police operations: is not greater for police in densely populated communities; increases the responsiveness of police in dealing with community concerns, crime reports, and emergencies; and increases as the rate of serious crime increases.

There are statements where the police groups do not agree. For the following statements police from Singapore do not agree that there are differences among police departments of different sizes but police from Maldives believe that with respect to: technology awareness; internet use; SNS use for police operations and publishing location; the use of GIS for crime mapping and hotspot identification, the use of mapping applications, and the level of privacy and security assurance for shared information departments with 50-500 officers are more involved than departments with 500-1000 officers which are more involved than departments with over 1000 officers. With respect to challenges and restrictions on the use of SNS for police operations and public engagement departments with 50-500 officers are not different from departments with 500-1000 officers but the challenges and restrictions are greater than in departments with over 1000 officers. For the level of privacy and security assurance for shared information police from Singapore believe that departments with 50-500 officers are not different from departments with 500-1000 officers, but in both cases the level of privacy and security assurance for shared information is greater than in departments with over 1000 officers.

5.5 Practical Implications of the Findings

Based on the findings in section 5.3 and 5.4 there are practical implications for police and citizens from both nations. Promotion of e-Policing by police and other law enforcement agencies should target the following issues in order to achieve a closer understanding of e-Policing between police and citizens in each nation.

For the development of e-Policing in both nations:

- (a) Improve access to the internet and computers for police departments in remote and rural areas;
- (b) Increase internet knowledge, training, and experience with SNS and GIS among police;
- (c) For police who engage mainly with the public using SNS increase their responsiveness to crime reports and emergencies;
- (d) Frequently review internet usage laws, regulations, and policies which may limit the use of SNS by police but do provide for privacy, security, and confidential information;
- (e) Convince citizens from both nations that SNS is equally useful for interacting with police and other people.

The following apply to the development of e-Policing in the developed nation of Singapore. Citizens need to understand that:

- (a) People aged 18-35 years engage with police online more often than older people;
- (b) There is no difference between: the amount, meaningfulness, and detail of the content published by police and the public using SNS; police response rates for online and offline reporting of community concerns, crimes, and emergencies;
- (c) Police response times to relative location information are greater than for absolute location information reported with SNS.

The following apply to the development of e-Policing in the developing nation of Maldives.

- (a) Singapore police believe that, depending on the number of officers in the department, there are no differences with respect to the issues: technology awareness; internet use; using SNS for operations and publishing location; and using GIS and mapping applications. Police from Maldives believe there are differences (Table 3, LCP 1(a)). This may be due to variations in the sizes of departments represented by the respondents. Police from Maldives are mainly from small departments with 50-499 officers. Police from Singapore also represent larger departments (Table A3). The police from Singapore where e-Policing is more developed have a better understanding of the relationships between department size and these issues. If so, then the responses from Singapore provide practical advice for Maldives police about the future where uniform demands associated with these issues across different department sizes may be expected as departments grow and e-Policing develops.
- (b) Increase awareness of e-Policing especially among citizens older than 35 years;
- (c) Citizens need to understand that:
 - (i) There is no difference between police response: rates and control rates for online and offline reporting of community concerns, crimes, and emergencies; times to relative location information and absolute location information reported with SNS;
 - (ii) There is no difference between males and females regarding online engagement with police;

- (iii) Compared to: other online communication methods with police SNS are used more often and for much longer periods of time; offline communication methods with police SNS require much less time and effort; and other online and offline methods of communication with the police SNS provides better levels of privacy and security;
- (iv) People are equally likely to engage with the police using SNS or by making physical contact;
- (v) The public and police prefer SNS that: have a large number of users; enable real-time interaction and location sharing; and allow the creation of personal user profiles;
- (vi) Police response rates to public reactions to their messages on SNS are usually less than what the public expects;
- (vii) Public responses to content published by police on SNS are usually very relevant to the content;
- (viii) Location information shared using SNS produces a significant response rate from the police and the public.

6. CONCLUSION

The theoretical framework developed in this study identified successfully similarities and differences among the groups of police and citizens regarding factors that influence the provision, adoption, and the use of e-Policing practices and services enabled by SNS and location-based services. The details are discussed throughout section 5 and in summary:

(a) In the developed nation of Singapore overall there is a high level of agreement among police and citizens for 90 percent of the issues in the: Social Media Content, Characteristics, Behavior, and Activities (SCBA); Location Characteristics, Behavior, and Activities (LCBA); and Individual Characteristics and Perceptions (ICP) categories of the framework. Agreement was highest for the SCBA category (93 percent) and only slightly less in the LCBA (88 percent) and ICP (87 percent) categories;

In the developing nation of Maldives overall there is agreement among police and citizens for only 56 percent of the issues in the same three categories of the framework. Agreement was highest for issues in the SCBA category (64 percent) and lowest in the LCBA (47 percent) with 52 percent agreement for issues in the ICP category. The most noticeable disagreement between police and citizens in Maldives occurred for 60 percent of the issues associated with the social media characteristics factor in the SCBA category and reactions and responses to shared location information factor in the LCBA category;

(b) For police from Singapore and Maldives overall there is a high level of agreement for 85 percent of the issues ranging from 71 percent for issues in the LCBA category to complete agreement for all the issues in the SCBA category. The most noticeable disagreement (70 percent) between police from Singapore and Maldives occurred for issues associated with characteristics of police departments and their social media and location usage in the Law Enforcement Agency Characteristics and Perceptions (LCP) category;

For citizens from Singapore and Maldives there is overall agreement for only 56 percent of the issues ranging from 48 percent for issues in the ICP category to 65 percent in the LCBA category with 57 percent for issues in the SCBA category. The most noticeable disagreements between citizens from Singapore and Maldives were for issues concerned with personal characteristics of individuals in the ICP category (67 percent) and social media characteristics in the SCBA category (60 percent).

Each of the four groups agreed that in police departments in developing and developed countries there is a significant difference in technology usage and experience related to police operations and the level of privacy and security of information shared with the public online. Also, limited internet knowledge and SNS experience significantly impacts the acceptance and adoption of SNS in police operations. This study found reasonable levels of agreement about such issues among the citizens and police from the developed nation of Singapore and police from the developing nation of Maldives. However, compared to these three groups the citizens from Maldives had different opinions about many of these e-Policing issues. These similarities and differences suggested a range of practical implications discussed in section 5.5 aimed at bringing the viewpoints on e-Policing among police and citizens in both nations into closer agreement.

There are limitations on the findings which may be addressed in future studies. The framework was derived from a comprehensive review of previous studies but other categories of factors and indicators may be introduced into the theoretical framework especially as further studies of e-Policing are undertaken. Singapore and Maldives were selected to represent a developed and a developing nation, respectively. Other nations in these categories need to be studied and compared in order to strengthen the external validity of the findings. Also, although the sample sizes were considered to be adequate, larger samples would enhance the validity of the findings. The technologies addressed in the study included SNS and other technology platforms (e.g. Google, Bing, smartphones, and GIS) and these were appropriate especially in Maldives. However, other technologies have applications in e-Policing (e.g. Internet of Things (IoT), cloud computing, and artificial intelligence) and they should be included in further studies.

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APPENDIX

A1. Questionnaire Section 1 for Citizens

Information: SNS means *Social Network System or Services*, GIS means *Geographical Information System*, Location means the place where an incident has occurred, *Relative location* means a place relative to other landmarks (e.g. buildings, street names), *Absolute location* means a place specified using a coordinate system (e.g. Geographical Positioning System (GPS) coordinates of latitude and longitude).

1. Your country: Singapore Maldives
2. Your age in years: 18-24 25-31 32-38 39-45 46-52 53-59 60 or more
3. Your gender: Male Female
4. Your highest level of education: No schooling completed High school diploma or the equivalent Associate degree Bachelor degree Master degree Professional degree Doctorate degree
5. How much experience have you had with e-Policing systems? less than 1 year 2-4 years 5 years or more
6. Which mapping services do you use for specifying location information in e-Policing? Google Bing Other (Please specify):
 I have no experience with this activity or the technologies
7. Which SNS do you use for specifying location information in e-Policing? Facebook Twitter Other (Please specify):
 I have no experience with this activity or the technologies
8. What do you use for sharing/publishing location information in e-Policing? Computers with broadband Internet connectivity Smartphones with Internet connectivity Other (Please specify): I have no experience with this activity or the technologies

Questionnaire Section 1 for Police

Information: Same as for citizens

1-5 Same as for citizens

6. Your years of police service: 1 - 2 3 - 5 6 - 10 11 or more

7. The section of the police service in which they are working currently:

- | | | | | |
|---|---|--|--|---|
| <input type="checkbox"/> General Administration | <input type="checkbox"/> Special Operations | <input type="checkbox"/> Investigation | <input type="checkbox"/> Forensic Services | <input type="checkbox"/> Strategic Planning & Service Development |
| <input type="checkbox"/> Finance and Accounting | <input type="checkbox"/> Information Technology | <input type="checkbox"/> Intelligence Services | <input type="checkbox"/> Police Academy | <input type="checkbox"/> Marine Police |
| <input type="checkbox"/> Human Resources | <input type="checkbox"/> Public Affairs | <input type="checkbox"/> Traffic Police | <input type="checkbox"/> Internal Affairs | <input type="checkbox"/> Tourist Police |

8. Your current working location: City District Province

9. Same as question 6 for citizens

10. The size of the Police Department where you are working: 50 - 499 officers 500 - 1000 officers More than 1000 officers

11-12 Same as questions 7 and 8 for citizens

Table A1: Personal characteristics of citizens and police

Gender	Citizens						Police					
	Singapore			Maldives			Singapore			Maldives		
	Frequency	Percent		Frequency	Percent		Frequency	Percent		Frequency	Percent	
Male	188	62.3		159	72.3		107	53.5		87	76.3	
Female	114	37.7		61	27.7		93	46.5		27	23.7	
Total	302	100.0		220	100.0		200	100.0		114	100.0	
Average	Mode = Male											
Age (Years)	Frequency	Percent	Cumulative Percent									
18-24	53	17.5	17.5	27	12.3	12.3	2	1.0	1.0	9	7.9	7.9

25-31	76	25.2	42.7	75	34.1	46.4	43	21.5	22.5	33	28.9	36.8
32-38	100	33.1	75.8	66	30.0	76.4	68	34.0	56.5	43	37.7	74.6
39-45	44	14.6	90.4	28	12.7	89.1	66	33.0	89.5	16	14.0	88.6
46-52	20	6.6	97.0	18	8.2	97.3	18	9.0	98.5	7	6.1	94.7
53-59	5	1.7	98.7	5	2.3	99.5	2	1.0	99.5	6	5.3	100.0
60 or more	4	1.3	100.0	1	0.5	100.0	1	.5	100.0	0	0	100.0
Total	302	100.0	-	220	100.0	-	200	100.0	-	114	100.0	-
Average	<i>Mean = 33years, Standard Deviation = 9 years</i>			<i>Mean = 34years, Standard Deviation = 9 years</i>			<i>Mean = 37 years, Standard Deviation = 7 years</i>			<i>Mean = 35 years, Standard Deviation = 9 years</i>		
Level of Education												
None Completed	28	9.3	9.3	6	2.7	2.7	0	0	0	1	.9	.9
High School Diploma or Equivalent	164	54.3	63.6	103	46.8	49.5	76	38.0	38.0	70	61.4	62.3
Associate Degree	80	26.5	90.1	22	10.0	59.5	87	43.5	81.5	13	11.4	73.7
Bachelor Degree	22	7.3	97.4	42	19.1	78.6	35	17.5	99.0	17	14.9	88.6
Professional Degree	2	.7	98.0	22	10.0	88.6	0	0	99.0	7	6.1	94.7
Master Degree	6	2.0	100.0	24	10.9	99.5	2	1.0	100.0	6	5.3	100.0
Doctoral Degree	0	0	100.0	1	0.5	100.0	0	0	100.0	0	0	100.0
Total	302	100.0	-	220	100.0	-	200	100.0	-	114	100.0	-
Average	<i>Mode = High School Diploma or Equivalent</i>			<i>Mode = High School Diploma or Equivalent</i>			<i>Mode = Associate Degree</i>			<i>Mode = High School Diploma or Equivalent</i>		
E-Policing Experience (Years)												
1 or less	81	26.8	26.8	89	40.5	40.5	24	12.0	12.0	12	10.5	10.5
2-4	144	47.7	74.5	98	44.5	85.0	117	58.5	70.5	49	43.0	53.5
5 or more	77	25.5	100.0	33	15.0	100.0	59	29.5	100.0	53	46.5	100.0
Total	302	100.0	-	220	100.0	-	200	100.0	-	114	100.0	-
Average	<i>Mean = 4 years, Standard Deviation = 2 years</i>			<i>Mean = 3 years, Standard Deviation = 2 years</i>			<i>Mean = 5 years, Standard Deviation = 2 years</i>			<i>Mean = 5 years, Standard Deviation = 2 years</i>		

Table A2: Technologies adopted by citizens and police

Mapping Services	Citizens				Police			
	Singapore		Maldives		Singapore		Maldives	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Google	201	66.6	172	78.2	169	84.5	93	81.6
Bing	50	16.6	19	8.6	27	13.5	10	8.8
Other	2	0.7	4	1.8	4	2.0	1	.9
No Experience	49	16.2	25	11.4	0	0	10	8.8
Total	302	100.0	220	100.0	200	100.0	114	100.0
Average	<i>Mode = Google</i>							
Social Network Sites								
Facebook	190	62.9	134	60.9	166	83.0	84	73.7
Twitter	65	21.5	51	23.2	30	15.0	22	19.3
Other	0	0	7	3.2	3	1.5	3	2.6
No Experience	47	15.6	28	12.7	1	.5	5	4.4
Total	302	100.0	220	100.0	200	100.0	114	100.0

Average	Mode = Facebook		Mode = Facebook		Mode = Facebook		Mode = Facebook	
Technology								
Computers with broadband Internet connectivity	90	29.8	78	35.5	99	49.5	59	51.8
Smartphones with Internet connectivity	155	51.3	95	43.2	99	49.5	46	40.4
Other	0	0	0	0	0	0	1	.9
No Experience	57	18.9	47	21.4	2	1.0	8	7.0
Total	302	100.0	220	100.0	200	100.0	114	100.0
Average	Mode = Smartphones with Internet connectivity		Mode = Smartphones with Internet connectivity		Modes = Computers with broadband Internet connectivity and Smartphones with Internet connectivity		Mode = Computers with broadband Internet connectivity	

Table A3: Work characteristics of police

Police Service (Years)	Singapore			Maldives					
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent			
1-2	52	26.0	26.0	6	5.3	5.3			
3-5	117	58.5	84.5	25	21.9	27.2			
6-10	22	11.0	95.5	45	39.5	66.7			
11 or more	9	4.5	100.0	38	33.3	100.0			
Total	200	100.0	-	114	100.0	-			
Average	Mean = 4 years, Standard Deviation = 3 years			Mean = 9 years, Standard Deviation = 4 years					
Police Position	Singapore		Maldives		Police Position	Singapore		Maldives	
	Frequency	Percent	Frequency	Percent		Frequency	Percent	Frequency	Percent
General Administration	39	19.5	9	7.9	Police Academy	3	1.5	3	2.6
Special Operations	56	28.0	12	10.5	Marine Police	1	.5	3	2.6
Investigation	37	18.5	17	14.9	Human Resources	5	2.5	6	5.3
Forensic Services	8	4.0	10	8.8	Public Affairs	8	4.0	16	14.0
Strategic Planning & Service Development	4	2.0	4	3.5	Traffic Police	1	.5	5	4.4
Finance and Accounting	10	5.0	5	4.4	Internal Affairs	5	2.5	3	2.6
Information Technology	15	7.5	8	7.0	Tourist Police	1	.5	5	4.4
Intelligence Services	7	3.5	8	7.0	Total	200	100.0	114	100.0
Average	Singapore: Mode = Special Operations and Maldives: Mode = Investigation								
Size of Police Department	Singapore				Maldives				
50-499	46	23.0	90	78.9	City	56	28.0	81	71.1
500-1000	137	68.5	16	14.0	District	122	61.0	16	14.0
More than 1000	17	8.5	8	7.0	Province	22	11.0	17	14.9
Total	200	100.0	114	100.0	Total	200	100.0	114	100.0
Average	Mode = 500-1000		Mode = 50-499		Average	Mode = District		Mode = City	