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Research Article

Role of ICT in Community-Oriented Policing in South Asia: Challenges and Opportunities

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Abstract: Community-oriented policing (COP) as a model has found widespread acceptance throughout the world both in developed and developing countries. Similarly, Information and Communication Technologies (ICTs) have been embraced by many developed countries to augment COP initiatives. However, very little is known about the application of ICTs in COP in developing countries, particularly South Asia. In this article, we review the current ICT-based COP initiatives by focusing on some of the selected projects from developed countries and South Asia. The paper has used COP in the Khyber Pakhtunkhwa (KP) province of Pakistan as a case. While meaningful insights can be derived through learning from the experiences of developed countries, we highlight some major issues and challenges that are likely to be faced while implementing ICT based COP in South Asia. Moreover, we provide an overview of some exciting opportunities that arise as a result of embracing ICTs to enhance COP efforts for building trusting community-police relations and hence improving human security in the region.

Keywords: Community-oriented policing; Information and Communication Technologies; South Asia

1. Introduction

The police is considered the most visible and interactive face of government authority [1]. Over the past decades, a number of innovative and interesting policing models, such as smart policing[2], hot spots policing [3], evidence-based policing [4], problem-oriented policing [5], intelligence-led policing [6], and Community-oriented policing (COP)[7,8] have been introduced. COP is one of the most widely discussed initiatives that has gained popularity in various parts of the world [9,10]. The objective of COP is to include the local community in decision and policy making to build trust and improve human security through interactive exchange of information [11–13]. COP can be helpful in (a) engaging local communities in problem-solving, (b) combating crime, (c) building trust between police and communities (d) decreasing fear in citizens of being victimized, (e) public security information dissemination, and (f) augmenting limited police resources. COP aims to build an environment of trust and vigilance between community and police to improve human security by focusing resources on identifying and reducing chances for crime instead of chasing and catching criminals. The ideal candidates to identify and eliminate insecurities are not the police, but common citizens that know the area, people and circumstances they live in. On the other hand, despite the police having the legal right to utilize physical force, they have limited capability to proactively identify and reduce crime. Therefore, police need

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to develop a partnership with complementary resources including local community and civil society organizations [14].

In this article, we aim to review how means, i.e., police, community, and ICTs might be leveraged for community-oriented policing (proximal end), which in turn could lead to achieve one or more ultimate ends that include human security, the protection of human rights, and improvement in trust between police and the community (see Figure 1). The focus of this work is to analyze various COP initiatives that are being taken in different regions of South Asia to built trust between community and police and improve human security.

Information and Communication Technologies (ICTs), such as smart phones, computers, and the Internet have the potential to support COP in that they can provide opportunities for extended participation and consultation of the local community in policing. ICT in COP in developing countries can also: (a) improve communications between police and community, (b) identify a wider variety of insecurities that are context based (c) effectively utilize limited resources through targeted policing, (d) move beyond the customary bureaucratic procedures (e) improve participation of women, minorities, and vulnerable population in COP, and (f) contribute to empowerment of the community. ICT-based COP should have the capacity and technology to identify and respond to local challenges.

While the potential of using ICT in COP in developing countries is promising, it can at the same time face significant ethical and socio-economic challenges. The use of ICTs can, for example, give the police quick access to huge data and information, such as wanted criminals, crime history of a criminal, digital fingerprints, stolen vehicles, traffic violations, and information on firearms, that could contribute to more effective crime prevention, reporting and response. Access to a large volume of public data and information could, however, be misused by authorities for targeting vulnerable groups and individuals, and would require both an accountable and depoliticized police, as well as technical capacity to ensure proper data privacy and protection measures. Socio-economic constraints on both the police and public can also be significant, limiting access to devices, as well as one's capacity to use ICTs due to, for example, limited literacy and access to training.

In general, the majority of the literature related to ICTs in COP is devoted to the experiences and projects conducted in developed countries. There are very few works reported in the literature about the experiences and projects conducted or being conducted in developing countries, and in particular in South Asian countries including: India, Sri Lanka, Bangladesh, and Pakistan. To the best of our knowledge, there is no comprehensive study that provides a detailed review and analysis of recent initiatives in the domain of ICT for COP. A main objective of this study is to fill this gap, posing the question: What is the state-of-the-art in the use of information and communication technologies for COP in South Asia? Through this exercise, we wish to gain better insight in the potential use of ICTs in community-oriented policing in South Asia. In doing so, we analyze potential challenges and opportunities that can arise while integrating ICTs in COP and related activities in developing countries of South Asia.

1.1. Methodology

To address these objectives, we conducted a comprehensive literature review of available reports and research studies from various sources including academic institutions, government, NGOs, and United Nations. We also reviewed the dominant historical and current practices of community policing in South Asia. Our framework for analysis of the literature focuses on four areas:

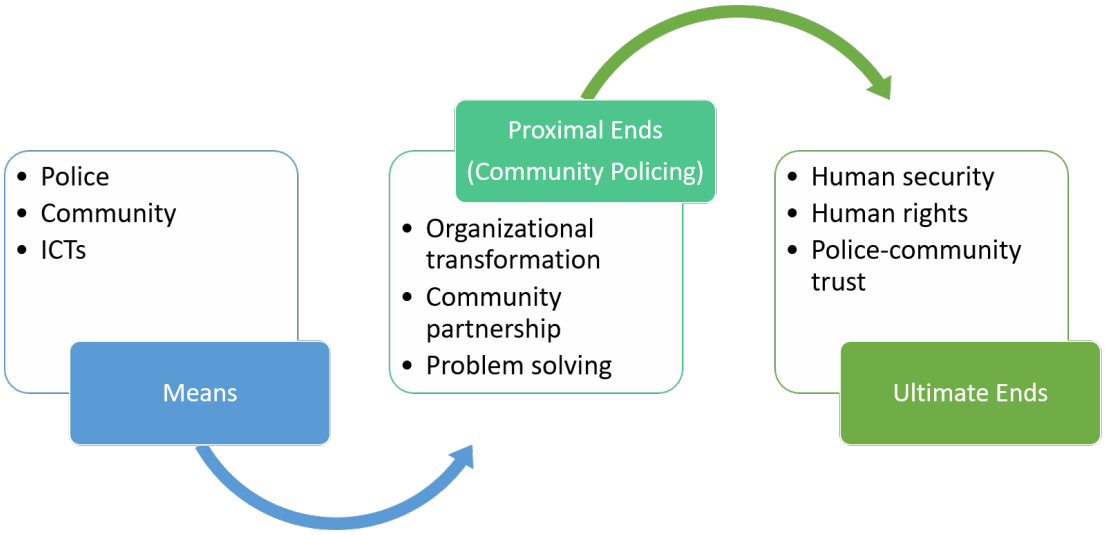

Figure 1. Relationship between ends and means of COP and ICT

1. An exploration of trends in COP models globally, where we explore COP in both developed and developing countries to gain insight on current experiences
2. An exploration of COP and ICTs, globally and in South Asia in particular
3. Identification of the opportunities that can be leveraged through the use of ICTs in COP
4. Analysis of the challenges that need to be addressed for successful use of ICTs in COP. These challenges are categorized as institutional, social, and technical

The examples from Khyber Pakhtunkhwa (KP) province of Pakistan are taken from police documents available in hard copy or online from the police, as well from interviews with police officials at mid-level career and key informants from the community that include common men and women, as well as members of the district government in Swat, KP. From this review, we develop a conceptual framework that provides the bases for analyzing the extent to which ICTs can be leveraged to assist COP efforts. This paper is an initial stepping stone towards a larger study that will examine empirically the impact and use of ICTs, particularly in South Asia, to improve COP efforts.

1.2. Organization of the Paper

The remaining sections of the paper are organized as follows. In section two we provide an overview of COP, including a review of the current state-of-the-art related to COP efforts in developed and developing countries specifically focusing on South Asian countries. Section three looks more closely at ICT in COP. Prospective opportunities that can arise with the use of ICTs in COP are highlighted in section four, while challenges faced in South Asia for adopting ICT based COP are discussed in section five. Finally, concluding remarks are provided in section six stating that ICTs have the potential to improve police-community relations. However, such technologies must be carefully analyzed as to what extent these technologies can improve human security and police efficiency while keeping the privacy of citizens at the forefront.

2. Overview of COP

According to Nalla and Mamayek [11], the majority of the top 20 democratic countries of the world have included community members in the process of overseeing the police. They claim that this reflects the importance of civilian participation in police accountability in democratic societies, something which leads to increased public satisfaction as well as improved police-community relationships [11]. The ways in which community members interact with the police in order to ensure accountability, trust, and constructive communication, however, vary according to the local historical and cultural context. Nevertheless, there are several types of activities that can be identified in many of the contexts where COP has been implemented.

2.1. COP Activities

According to the literature [9,15–17], COP efforts usually comprise, but are not limited to, the following activities to improve public safety and establish trust between police and community.

1. **Regular Patrols.** Regular patrols have in some contexts been shown to have significant effect on police-community relations as well as reducing crime rate and fear of crime in communities. This contrasts with a traditional policing model where the police are available at the police stations and people are to required visit police station to report the crime. In COP models, police officials often perform regular patrols, on foot or vehicle, to meet and interact with the community. Moreover, it is believed that continuous and regular presence of police in neighborhoods has been found to have a positive impact on police-community relationship because people feel more comfortable to approach and share their concerns with a person that they are familiar with. Similarly, presence of police in the neighborhood may also act as a deterring factor to reduce crime [18].
2. **Mobile Police Services.** These help in providing essential police and administrative services to remote communities that otherwise may have to travel long distances to reach police stations. This is particularly beneficial for the people living in remote villages and hilly areas with sparse transport access and road connectivity. Since it can be difficult to provide such services on a daily basis, the mobile police services are often provided on designated days on weekly, fortnightly, or monthly basis depending on the requirements and available resources.
3. **Community Forums.** These provide a common platform for various stakeholders of COP, such as government, police, and community. The primary objective of these forums is to highlight and address the persistent community concerns before these escalate to bigger problems. Keeping in view the available resources, key community concerns are discussed and solutions are provided at the community forum meetings held regularly. The advantage of these forums is that many smaller issues can be resolved on the spot that otherwise might require more formal police or government intervention. They can also uncover competing interests and concerns within communities [15].
4. **Community Awareness-Raising.** These activities are meant to provide community members with necessary information required to stay safe and avoid common dangers. Community awareness is conducted in many ways, including: (a) door-to-door visits, (b) trainings, (c) television ads, (d) local announcements, (e) school visits (f) mobile alerts, and (g) use of social media.

Table 1. Comparison of traditional policing and COP [24]

Parameter	Traditional Policing	COP
Basic philosophy	To arrest, investigate, and detain offenders, to maintain law and order.	To protect the human rights of people and prevent crime.
Focus	Fighting crime	Neighborhood problem solving
Response	Reactive	Proactive
Accountability	Limited	Total accountable
Transparency	No	Yes
Public feedback	No	Yes

5. **Complaint Management.** These are systems where any member of community can raise their concerns related to the safety of their neighborhood or about the behavior of police officials. There is usually a platform for submitting individual and community complaints and providing feedback. The community members can also provide their feedback related to various problems highlighted in the forums.

2.2. Comparison of Traditional Policing and COP

COP is an initiative with a different philosophy, focus, and response compared to the traditional policing model. A brief comparative analysis between traditional policing and COP is given in Table 1.

In summary, COP emphasizes participation of community in the prevention of crimes, in contrast to traditional policing that focuses on crime fighting and law enforcement as a response to crime. Some studies have shown that COP may have limited effect on crime reduction, but COP features, such as accountability, transparency, and public feedback may have positive impact on trust in the police and citizen satisfaction [13]. Traditional or standard models of policing involve maintaining order, service provision, crime reduction, and conflict resolution with little or no consultation with the community. In contrast, COP is a problem-solving process that draws upon active citizen participation in identifying and solving causes of disorder, crime, and fear in the community.

An essential feature of the traditional policing model is the use of force by the police to apprehend criminals. The reasoning behind this is that offenders do not like to get caught and to be punished [14]. It is also believed that given the opportunity, offenders will resist and, consequently, police must apply force to overcome the resistance. It is this application of force that raises concerns related to human rights. Human rights training guides the police on how to apply force while catching the offenders or protecting themselves. There can be, however, a contradiction between the theory of applying force and adhering to human rights principles. The police are often faced with situations where they need to either apply force or respect human rights, and in the end they may fail to do their basic job of catching offenders [14]. While using force may allow police to catch offenders, it does not necessarily prevent crime. A traditional policing model allows the police to use powers in whichever way they consider appropriate to catch the offenders, which makes police less accountable. In a COP model, however, the police establish a partnership with the community to proactively eliminate crime. Police and the local community jointly work to identify and solve local problems. The partnership between police and community not only makes the police more responsive to local problems but also makes them more accountable in exercising their powers to use force and adhering to human rights.

2.3. COP in South Asia

COP has been implemented in various parts of Asia, such as Japan, China, Singapore, India, Bangladesh, Sri Lanka, and Pakistan just to name a few [19]. However, COP models vary in different regions significantly due to the social, economic, historical, and political context of local communities and the structure of the police. If a COP model is applied in another context, it would need to be adjusted according to the local context. For instance, the Japanese COP model, Koban, was imported to Singapore where it was reconstructed according to local norms as Neighboring Police Posts [20]. In turn, the Singapore COP model was implanted in some Indian states, such as Goa, Tamil Nadhu, and Uttar Pradesh [20]. According to Nalla and Madan [21], 12 states in India have over the past decade adopted COP models to improve police-community relationships and address local problems. Similarly, there are efforts underway in Sri Lanka [22] to implement COP in certain urban and rural regions of the country [15]. However, it has been observed that the COP model chosen has proved to be more effective in rural areas of Sri Lanka where the local community is more supportive of the initiative compared to the urban areas [23].

Bangladesh has also taken steps to introduce COP. In this regard, COP initiatives are taken in various divisions, such as Rangpur and Rajshahi [25,26]. In recent years, significant advances have been made by Bangladesh police to incorporate COP in organizational structure and policy making. These advancements indicate a positive trend in adopting COP as an institutional culture. Moreover, many policy documents and guidelines have been developed to support implementation efforts. However, it is unclear to what extent these policies have been implemented in the field. In many cases, the implementation efforts depend on the personal motivation and commitment of police officers (an important point to keep in mind when addressing corruption issues). Similarly, consistent political support and incentives are required for long-lasting implementation of COP. Moreover, there is a lack of understanding and misconceptions among police officials, especially at lower levels, about the interpretation of COP in the field [25]. Even some police officials believe that COP entails that police relinquish some of their power and functions to community, and that will deprive police from the authority required to control crime [27]. In this context, motivation of political and police leadership to provide sustainable budgetary and moral support is considered essential. Further, there is no data available on the role and usage of ICTs in strengthening the implementation of COP in Bangladesh.

The Ministry of Interior Afghanistan (MoIA) envisioned a ten-year program to reform national police from a 'militarized' force to a 'service' unit with COP and ICTs at the heart of this plan [28]. To this end, MoIA launched a radio channel "Radio Police" with the aim to improve contact and communication between police and community. In 2009, a community policing pilot project was launched in consultation with various stakeholders including civil society, parliamentarians, academics, NGOs, media, and community members representing vulnerable groups, such as ethnic minorities, women, and children. Continued involvement of civil society organizations led to the implementation of Afghanistan Democratic Policing Project (ADPP). Initiated in 2013, ADPP was a three-year project involving national and international NGOs focusing on improving police-community relations. Although one can argue that current efforts of MoIA are very limited, such measures can play a considerable role in improving trust and the relationship between police and community despite the insurmountable challenges currently being faced by the conflict and post-conflict society of Afghanistan [28].

Presently, COP units have been established in eight provinces of Afghanistan including Kabul, Balkh, Kunduz, Baghlan, Bamiyan, Ghor, Herat, and Helmand. In Afghanistan, COP units are called 'Police-e Mardume'. They are a part of the regular police force and perform routine police obligations too. Activities practiced by 'Police-e Mardume' [29] include community-police consultation sessions, 119 hotline, sport events, mobile teams, school and university outreach programs (supported by EUPOL, GIZ, LOTFA), joint work with scouts program, seminars at the national and sub-national level, and workshops.

In addition to COP, the local or tribal 'Shura' is an informal security provider that may include night and neighborhood watch boards. A civil society organization carried out a project in northern provinces of Afghanistan during which Shuras were helped to establish *'neighborhood watch committees'*. Similarly, neighbor watch groups established in the Nimruz province proved to be effective in improving security situation at night. It must be noted here that these neighborhood/night watch committees are more focused towards crime prevention rather than fighting terrorism and counterinsurgency. Shuras not only establish neighborhood watch committees but also look after conflict resolution by involving community elders. Although these are informal institutions, they can as well link with COP to improve police community relations.

COP has been implemented in many regions of Pakistan adopting different models. For instance, in the province of Sindh, and particularly in the city of Karachi, Citizens Police Liaison Committees (CPLCs) have been established [30]. The primary goal of CPLC is to take preventive measures to improve the deteriorating situation of law and order with the coordination of law enforcement agencies. CPLC is a unique initiative of community-police partnership where citizens volunteer their services and take charge to maintain law and order. The focus of CPLCs is to provide technical assistance to law enforcement agencies for crime prevention and monitoring using ICTs, such as computerized sketching, crime pattern recognition, and mobile phone tracking to name a few. CPLC has started Neighborhood Care (NC) projects in different areas of Karachi to improve safety and security through close liaison between residents and police. The NC project resulted in significant decrease in heinous street crimes along with other neighborhood maintenance operations. Historical data shows a more than 90% reduction in crimes, such as burglaries, mugging, and other street crimes. In addition to Karachi, CPLCs have also been established in other cities of the country, such as Faisalabad, Lahore, Sargodha, and Peshawar. Similarly, in 2011 Inspector General of Police (IGP) Sindh introduced the concept of Community Policing Centers (CPCs). The objective of establishing CPCs was to facilitate liaison between police and local community to control the street crimes in the province. However, despite the initial establishment of 160 CPCs, the initiative did not continue due to lack of resources and personnel. To promote COP in the capital city of Islamabad Citizen Police Coordination Committees (CPCCs) were established. The aim of CPCC is to: (a) improve police-community relations, (b) monitor activities at police stations, (c) provide suggestions to improve traditional police station culture, (d) report non-cognizable cases. Non-cognizable cases (e.g., assault, cheating, and forgery) are those wherein a police officer has no authority to arrest without a warrant, and (e) resolve minor civil disputes through arbitration [31].

Another interesting initiative has been launched by district police of Khanewal in Punjab province of Pakistan to

implement COP at Union Council (UC) level. In this model each UC is considered a 'beat'. In each beat, crime control and reconciliation committees are created comprising up to 10 members including a beat in-charge police officer and community members. The role of the crime control committee is to identify crimes, criminals, crime hotspots, and information gathering. Reconciliation committees on the other hand assist the police in resolving disputes at local level [32]. The UC-based beat initiative became successful and received support from local community and police departments in terms of appreciation and resources. Consequently, the UC-based beat model has been implemented in other three districts of Multan region including Vehari, Lodhran, and Multan. Moreover, the Punjab police chief is considering replicating the UC based beat model across the province and in this regard feedback has been sought from other districts.

In various other parts of the region, some form of community based policing is already present but with a distinction from the model currently present in western countries, such as USA, UK, and Canada. For instance, in contemporary China, mass-line policing is followed [33]. The mass-line policing model can be simply defined as *'for the masses, relying on the masses, from the masses and to the masses'* [34]. Similarly, in various parts of Pakistan and India the traditional *"Jirga"* or *"Panchayat"* system is adopted to resolve issues at village level [35,36]. In Gujranwala district of the Punjab province, Pakistan, for example, villages effectively linked police with community meetings based on the traditional *'panchayat'* system of community elders [35]. The COP model was based on two tiers. On the first tier, community meetings are held in villages, where community members can express their concerns and share opinions with village elders, police, and council members. The second tier consists of *'chowkidars'*; local residents responsible for bridging the gap between police and community. *Chowkidars* are given the charge to tackle the confrontational disputes in villages and provide information and intelligence to the police [35]. Similarly, local peace committees (LPCs) initiatives made a significant contribution towards maintaining peace in the conflict-affected district of Lower Dir in KP province [37]. LPCs bridge the gap between local community and state authorities by providing information, identifying miscreants, and reporting subversive activities in the neighborhood. In the recent past, LPCs played a role in providing social justice and fighting militancy in some of the terrorism affected areas of KP. However, it must be noted that LPCs may not be considered as CoP but an extended system of informants. In Khyber Pakhtunkhwa (KP), police have moved beyond these informal institutions and started an initiative to formalize the involvement of local community by introducing Dispute Resolution Councils (DRC) across the province [38]. For instance, DRCs established in difference cities of KP province solved more than 7,000 cases while 1,465 cases were referred to relevant legal forums for action in the year 2017 [39]. DRCs aim to provide free and fast justice to citizens in petty civil cases. DRC members represent a cross-section of the local community, including retired civil and military officers, educationists, retired judges, religious scholars, professionals, businessmen, and journalists. They meet in a designated room within the police stations, where a police officer is assigned to ensure the meetings are held and followed up.

Tabular analysis of COP projects in Pakistan in terms of services provided by these projects and anticipated objectives is presented in Table 2 and Table 3, respectively. In Table 2, we see that there is no information to the public while most initiatives provide incident reporting and complaint management functionalities. Similarly, it can be seen in Table 3 that people are still feeling insecure (victimized). Whereas, common objectives of all the initiatives include engaging local community in problem solving.

Similarly, there are COP initiatives taken in other countries of South Asia, such as Nepal [40] and Maldives [41]. In case of Nepal, the initiatives are not widespread and a significant proportion of local community is either unaware of the existence of COP or do not understand how COP works. In the Maldives on the other hand, police have a proactive approach for reducing crime and incorporate COP through interaction with community elders, youth, parents, and business owners. COP in Maldives is more focused on reducing gang-related violence that is also linked with drug trafficking. The Maldives police started an interesting initiative to engage local youth and even gang members in sports activities, such as soccer. According to police, these sports events have proven to be effective in building trust and improving relationships with local youth. Another initiative by the Maldives police is the establishment of crime prevention committees with the objective of bringing together the leaders of community and police to promote community-oriented solutions for crime prevention [41].

Table 2. Analysis of COP initiatives in Pakistann

Initiative	Incident Reporting	Regular Patrols	Mobile Police Services	Community Forums	Information dissemination	Complaint management
CPLCs	✓	✓	x	✓	x	✓
CPCCs	✓	x	x	x	x	✓
UC beat	✓	x	x	✓	x	✓
Panchayat	✓	✓	✓	✓	x	✓
LPCs	✓	x	x	✓	x	✓
DRC	N/A	N/A	N/A	x	N/A	x

Table 3. Objectives of COP initiatives

	Combating crime	Engage local community in problem-solving	Decreasing fear of being victimized	Information dissemination	Dispute resolution
CPLCs	✓	✓	✓	x	x
CPCCs	✓	✓	x	x	✓
UC beat	✓	✓	x	x	✓
Panchayat	✓	✓	x	x	✓
LPCs	✓	✓	x	x	x
DRC	N/A	✓	N/A	N/A	✓

2.4. Community-Oriented Policing and Women

Women police are often considered better communicators compared to male colleagues, exhibiting better interpersonal skills. According to studies conducted in the US, women police officers are preferred by community members to respond and defuse potentially dangerous situations [42]. As the focus of policing shifts from a forceful, physical model to a service model, and women's roles in society have become less rigid, arguments of women being unsuitable for the police are becoming less prevalent. Communities now demand more interaction with police in non-traditional less enforcing matters, such as crime prevention, youth interaction, and presence of police personnel in the neighborhood [43]. Better communication and interpersonal skills are thus in greater demand, which are often more associated with women police. Moreover, research studies show that women have more respect for citizens and generally are more supportive of community policing principles [42].

Similarly, women police have proven to be more effective in handling complaints of domestic violence. A fundamental aspect of community policing is that it should reflect, understand, and appreciate varying experiences within the community. Since domestic violence is mostly experienced by women, it is reasonable to believe that women police are better positioned to respond to such cases [44]. According to Gilmore and Srivastava [44], policewomen are less likely to use excessive force, be involved in allegations, receive bribes, and engage in corruption. Consequently, increasing the percentage of women in police is likely to reduce the complaints against police and can have positive impact on police-community relationships [44,45].

In South Asia, there have been a few community policing initiatives specifically targeted to address the security issues faced by women. For instance, a one-year pilot project was launched in two cities of India (Hyderabad and Chennai) to make public spaces secure and safe for women with the help of teams comprising police and student volunteers [46]. Similarly, many model police stations have been established in different cities of KP province of Pakistan. These model police stations have women's desks where trained women staff deal with the complaints from women and assist them in legal processes [47]. Dispute Resolution Councils (DRCs) are also established at model police stations as an alternate dispute resolution mechanism comprising community leaders and elders. However, there is little representation of women in the DRCs, which makes it less affective for women since they are not allowed to contribute freely. On the other hand, 33% representation is ensured for the women at all levels of community policing engagements in Bangladesh, such as community policing forums at wards level [48]. In Afghanistan, Family Response Unit (FRU) is an important channel that is used to resolve domestic crimes and conflicts particularly involving violence against women and children.

One way to increase awareness of women-related security issues is to actively engage women's rights organizations to promote police-community participation. Moreover, training workshops and awareness seminars can be conducted to enhance police awareness of women security issues [49]. Further, active and proportionate participation of women could be ensured at all levels of community policing engagements, such as DRCs and community forums.

3. ICT and COP

Recent advancements in computing, communication, and mobile technologies has led to the development of many exciting and interesting applications for policing. ICTs have been exploited to develop systems targeted towards improving neighborhood security, detection, and prevention of crime. Several applications have been developed using ICTs that include active involvement of local community in the aforementioned goals [9,50–52]. In subsequent paragraphs, we briefly mention some of the initiatives that use ICTs to augment COP.

3.1. ICT and Policing Initiatives in Developed Countries

Anderson Software developed a mobile application for iPhone and Android named *'TipSubmit'*. The application allows users to submit tips to law enforcement agencies and any other designated authorities anonymously. Users can report about an incident or crime through text messages, photos, and videos with exact locations using Global Positioning System (GPS). The application also facilitates two-way communication between users and law enforcement personnel in case both parties are online [53].

Victoria police department released a mobile application that helps in crime reporting and fighting in Victoria, Canada [54]. The application works on mobile smart phones and can be used to report various crime related activities, such as vandalism, lost or stolen goods, theft from vehicle, fraud, counterfeiting, shoplifting, and found, lost or stolen property. Moreover, the application allows users to view and search through photos or videos related to crime, lost and stolen goods. Users can view crime map to get an overview of crimes within their vicinity. The application is integrated with social media, such as Facebook, Twitter, and YouTube channels of Victoria police department to provide users with an opportunity to interact and receive latest news and updates. Furthermore, the application enables users to submit anonymous tips to police to help the police fight against crime.

In 2004, police forces of two Dutch regions launched a communication service termed *SMS-alert* [51]. This particular COP initiative aimed to improve the service delivery and interaction with the citizens. SMS-alert was designed as a location-based service that works by informing and mobilizing citizens in an early stage of an incident. For instance, in case of a missing child or a robbery in a specific area the people in the proximity are alerted through SMS. Moreover, in SMS-alert service citizens are not mere receivers of the information but they also act as co-producers of public safety. In this way citizens act as eyes and ears of police, actively participating in the reduction and prevention of crimes in the neighborhood. With the success of SMS-alert in two police departments of Netherlands, after three years, seven more departments of the region adopted the SMS-alert service with several more interested to adopt in the near future. According to Korteland and Bekkers [51], the factors that contributed to the success of SMS-alert and its adoption by other police forces include: **(a)** marketing by the project manager, **(b)** experience sharing, and **(c)** coverage by media. Similarly, the authors also highlight the fact that in certain police forces the adoption of *SMS-alert* was hindered due to another competing technology termed *Burgernet* also named *Citizens Net* [51].

Citizens Net [52] is an ICT based COP initiative in Netherlands that is being supported at the national level. People from the local community voluntarily sign up to participate in *Citizens Net*. In case of any incident, police can contact the signed-up participants through a telephone call or SMS to gather information in the specified area where the crime has occurred. Moreover, there is a *Citizens Net* website that provides the status of recent cases as well statistics of previously handled cases. However, the *Citizens Net* website does not provide interactive communication between police and citizens. Police can only contact the citizens in case of any incident.

Chicago police have developed a website named CLEARpath for information sharing with the community [9]. CLEARpath emerged as a byproduct of the web tool CLEAR (Citizen and Law Enforcement Analysis and Reporting System) developed by the Chicago police. CLEAR helps Chicago police to *"police smarter"* through finding crime hotspots, networking with other agencies, and extensive mapping of crime scenes. The CLEAR system was only intended to be used by Chicago police. Consequently, CLEARpath was developed to provide information access to local communities. The CLEARpath website is designed to provide a multitude of information to the community, such as maps of crime scenes, wanted offenders, awareness related to gangs, information material related to staying safe, preventing crimes, events, and resources. Moreover, the website also enables the community to report crimes, launch complains about police behavior, and community concerns. However, a major drawback of CLEARpath is that it does not include an interactive groupware module where members of community can engage in discussions to share their views and actively participate in collective problem-solving. Apart from the CLEARpath, the representatives of Chicago police have regular monthly or quarterly meetings with community members to share information and concerns.

3.2. ICT and Policing Initiatives in South Asia

While there have been many initiatives in certain regions of developed countries to include ICTs in COP, developing countries, and especially in South Asia are lagging far behind in this regard. However, there are few initiatives underway in South Asia to harness ICTs for improving COP efforts. In the subsequent paragraph we will briefly outline some of these initiatives.

In the recent past, Punjab, Sindh, and KP police departments in Pakistan have started initiatives to incorporate ICTs, mainly to enhance managerial efficiency and monitoring activities such as storage, retrieval, processing, and analysis of crime data. For instance, the KP police launched an initiative to involve the citizens in improving the efficiency and service of police department. In this initiative, citizens can launch a First Information Report (FIR) and check the status of their FIR online through a website [55]. Senior administrative police officials can also view the status and inquire about the FIR from local police stations. There is another system as well wherein citizens can report the misuse or abuse of powers by any police or government official over the phone to the provincial government's designated officials [56]. The KP government has also launched a mobile application that allows citizens to register complaints

regarding government service delivery. Citizens can attach a geo-tagged multimedia content, such as photo, audio, and video to support the complaint and ensure prompt action [56]. CPLC also uses ICTs to store and analyze crime related data, such as vehicle and mobile theft, target killings, computer sketching, and crime patterns. The police have solved various cases with the assistance from CPLC using ICTs. Punjab Information Technology Board (PITB), developed a web and android-based application that enables police officials and/or witnesses to report a crime [57]. The mobile application allows users to report crime related data with photos/videos, location, date, and type of crime. The recorded information is collected at a central data warehouse for further processing and record keeping. An important feature of the application is that it is developed in the national Urdu language for ease of use and better understanding. The data collected at the data warehouse can be used to identify crime patterns, hotspots, and offenders in certain areas. Currently the application is only being used in the provincial capital city of Lahore. More recently, Lahore city police has established a centralized operations center to enhance interaction with local citizens. Citizens can interact with police by sending complaints through SMS or email and the relevant public feedback monitoring desk (PFMD) ensures that required action is taken against each complaint [58].

Similarly, there have been a few initiatives taken in India to incorporate ICTs to improve policing and enhance the participation of the local community. For instance, in the Andhra Pradesh state police department started eCOPS initiative which is a database for crime reporting and management [59]. The eCOPS system was targeted to ease the process of registering an FIR and monitor the progress of a case by visiting any police station in the vicinity or through the police website. This helps citizens to easily register FIRs, have less apprehension, and feel less inhibited by reducing frequent visits to police stations where they can face strict formalities related to registering an FIR or inquiring about the status of an existing FIR. The eCOPS database also facilitates police officials from different jurisdictions in checking the criminal history of suspects online through the Internet, something which was earlier done manually through personal calls or faxes. A similar initiative with the name Lokvani was started in Sitapur district of the Uttar Pradesh state. In this initiative, Lokvani centers, also termed Lokvani kiosks, were established in various areas of the district where computer and internet connection was provided [59]. Citizens can register their complaints through the online system using established Lokvani kiosks. The complaints received through the Lokvani kiosks are sorted at the district's Magistrate office and are marked for action. Progress on action taken on each complaint is closely monitored in weekly meetings overseen by an apex society created at state level. Hyderabad Telengana police launched a mobile application named 'Hawk Eye' for improving public interface with police and participation in community policing [60]. Among other useful features, the key highlight of Hawk Eye is that it allows for the reporting of cases of violence against women and has a safe travelling feature for women.

In Afghanistan, the first major ICT initiative taken by the Ministry of Interior Afghanistan (MoIA) was the launching of 119 helpline in 2009 [28]. Initial aim of the helpline was to assist citizens in making complaints against police corruption, misbehavior, and human rights violations. Later the helpline was also used to report terrorist and criminal activities. The helpline was extended to five more provinces of Afghanistan in the year 2013, however, majority of the provinces still do not have the helpline. Moreover, MoIA started to use Twitter and Facebook for information sharing. Through Facebook and Twitter pages, police can provide information about their activities and citizens can provide feedback as well as post problems within a neighborhood.

Nyborg and Nawab identified challenges in the implementation of Afghanistans 119 helpline [61]. One of the key challenges of such a system is to ensure that the received information is forwarded sufficiently fast to the correct intended office and the identity of the caller is protected. Eight years after implementation this was still not the case and represents a serious defect in the system. This is mainly due to the fact that the system was developed and delivered without considering the local context, without sufficient testing, and with no provisions for maintenance. The Afghan National Police themselves lack the expertise and funds to upgrade the system. Protecting caller identity, controlling access to data, and ensuring that informants or the police do not use the system to oppress the community are all aspects which need attention before expanding the system to new provinces. Neglecting these aspects may lead to reduction in communication and trust between community and police.

4. Opportunities for ICT-Based COP

In many parts of the world, such as Brisbane [62], Durban [62], Italy [63], and Singapore [64], it has been found that ICT-based governance leads to more transparency, accountability, and better communication between local and national government and the community. ICT-based e-Governance not only ensures the aforementioned essential factors of better governance, but also provides numerous opportunities for increased civic engagement of people in important policymaking. Similarly, policing is also considered as an information intensive job [65]. The availability of timely and accurate information can greatly improve performance of police in the crucial task of crime fighting. With the use of ICTs coupled with COP, a number of innovative technologies can be explored that will allow both citizens and police to create, share, and use a multitude of information in the form of text, audio, and videos. The introduction of ICT-based COP does not necessarily compete with the existing organization and mission of the police. Rather, ICTs, when applied wisely with the interests of the public at heart, can rather enhance and improve policing in general, as well as

the work of other participating agencies [9,66,67].

The use of ICTs in policing can be broadly classified into two categories: (a) ICTs that improve operational efficiency and (b) ICTs that contribute to enhancing COP. For example, ICTs can be leveraged to augment limited police resources for the implementation of COP in developing countries, as well as enhance problem-solving efforts, improve community trust and participation, and increase partnership initiatives between police and community [68]. Below we present some specific areas where ICTs can contribute to policing and COP, as well as some of the factors and challenges affecting their use.

4.1. ICTs for Policing

4.1.1. Problem Solving

Robust ICT systems that can timely deliver required data accurately to police officials can significantly enhance the problem-solving capacity. Police problem solving is a tedious work and often requires access to a multitude of traditional and nontraditional information, such as offender data, incident details, call logs, property data, and mobile phone traces just to name a few. ICTs can provide the services to allow better management and access to required information for improved problem analysis and identification. Databases can be developed to create a repository of identified problems and relevant innovative solutions applied against each problem. The database repository can be shared among multiple agencies so that it can be referenced in case the similar problem is confronted in future.

4.1.2. Internal Communication

ICTs have the potential to improve organizational willingness and support for COP by facilitating internal communication systems of police. This can be achieved by providing services that includes, but are not limited to: electronic memos, customized reports, and electronic data dissemination. Use of ICTs for internal communications can greatly improve the transparency, accuracy, and problem solving of police department. Adoption of electronic incident reporting through websites and mobile phones can lead to improved efficiency and responsiveness.

4.1.3. Increase Inter-Agency Cooperation

With the help of ICTs, cooperation among police and allied agencies can be increased. Improved inter-agency collaborations can potentially lead to sustained reduction in crime and increased crime prevention. Moreover, terrorism has become a major concern all over the world and South Asia is no exception. Particularly in Pakistan, dealing with terrorism has become the main challenge for government. According to Chermak *et al.* [69], success in preventing future terrorism heavily depends on the ability to collect, analyze, and disseminate intelligence information regarding prospective terrorists and terrorist attacks. The information can comprise the individuals who want to attack, what tactics they can use, and their intended targets. Inter-agency cooperation along with active community participation can be instrumental in confronting the problem of improved public safety, reduce crime, and detect terrorism. Addressing the aforementioned public security problems from different dimensions and targeting multiple sources of problems simultaneously will be beneficial. Comprehensive strategies involving multiple agencies to tackle the problem from multiple angles are more likely to achieve desired results compared to a single agency or strategy. However, there can be certain pitfalls in inter-agency collaborations that can be avoided through sincere commitment and strong leadership of participating agencies [69,70]. The police and community should not restrict themselves to any predefined model; rather explore innovative approaches to solve the problem considering local environment and culture.

It could also be useful to develop integrated ICT based solutions that bring together different segments of the society including police, local citizens, civil society, NGOs, and government departments. Such solutions could provide a unified platform to all the stakeholders for identifying and solving local community problems within a specific geographic area. Bringing together different segments of society could also be effective in terrorism afflicted conflict and post-conflict regions where trust deficit between government and local community is quite high. However, care must be taken while developing such technological solutions for community-oriented policing as there is a possibility that they could be co-opted by security agencies for surveillance of citizens. It is therefore important to incorporate civilian oversight mechanisms in the development of ICT based solutions. It is also possible that such applications could be developed and deployed by independent entities, such academia, research institutes and community-based organizations to enhance their adoption and legitimacy [71].

4.1.4. Participation of Women

In most of the South Asian countries, women are not encouraged to participate in policing activities or even visit police stations. In fact, in the forms of community-oriented policing that has been implemented in South Asia the role of women is almost negligible. However, being almost half of the population (approximately 48.5% estimated in 2015 [72]) and both witnessing and experiencing problems at first hand, women should play a significant role in the implementation and improvement of community policing. In this regard, ICT-based initiatives can play a vital role in enabling women to participate in community policing efforts without being involved in direct contact with police.

Crimes that are predominantly experienced by women are gender-based violence and sexual assault. Police are usually the fundamental first link for providing formal justice in such cases. These cases, however, are usually not reported to the police, and are thus not recognized or processed through the formal justice system. While there

could be numerous reasons behind women not reporting these cases, one factor is likely the lack of responsiveness and unequal gender composition of police, as noted in UN Women Report 2011 [44].

Considering the participation of women in the police force, the numbers are not encouraging throughout the South Asia. For instance, the average percentage of women in police is 2% in Pakistan with Gilgit Baltistan region having highest representation of policewomen at 3.4% [73]. India has around 6% representation of policewomen on average in the Indian police force with highest representation of women in Chandigarh with 14.6% [74]. Nepal police had approximately 7% women in the police force in 2015 [75], that is expected to increase to 10% by 2018 [76]. Similarly, Bangladesh has around 6% women in the police force [77], which was less than 1% in 1988 [78]. It must be noted that even in most developed countries, representation of women in police remains less than or equal to one quarter and even significantly less in higher ranks. Moreover, women belonging to ethnic or racial minorities have very poor representation in police [44].

Although governments in almost all the South Asian countries declare gender as a priority and aim to increase women's representation in the police, this has not been practically realized. The few initiatives taken by Ministry of Interior, Afghanistan (MoIA) have been with the support of international community in an effort to improve the participation of women in police. They include [79]: (a) 120-bed female residence built by Germany at police academy, (b) a gender adviser for MoI funded by Canada, (c) in-service training to police women delivered by Norwegian police, (d) a family violence unit established at a police station in Kabul with the support of US and UN that provides experience to police women in assisting female victims. Apart from lack of political will and ill-planned recruitment policies of the government, major reasons behind lower intake of women in police are cultural barriers. In general, the police are not considered a respectable occupation for women. Moreover, issues related to mobility and security of women add to the difficulty of recruiting and retaining women in police. Similarly, there is growing concern to address the gender disparity in Pakistan police services. Some of the initiatives taken to address the gender responsiveness in Pakistan police include: (a) establishment of women police stations, (b) improvement in recruitment of women, (c) introduction of new legislation for women protection, and (d) police training for gender sensitivity [80]. Some of the factors that influence gender-responsive policing in South Asia include gender disparities, religious and sociocultural factors, and availability of resources. These factors play key role both in the implementation of such initiatives and how they are received by different stakeholders.

In developing countries such as India and Pakistan, women do not to have equal access to technology as men. For instance, men in Pakistan are twice as likely to have a cell phone compared to women [81]. In South Asian countries where women are not provided equal space in the public sphere, ICTs have the potential to empower women by allowing them to connect with each other, government services, as well as explore new avenues for self-expression. For instance, in post-conflict Afghanistan, where women may not be permitted to go outside their houses, ICTs such as mobile phones and the Internet could provide access and connectivity to the outside world [28]. In these contexts, ICTs might provide a new space for women's participation in society. Moreover, ICTs have the potential to improve women's safety and security with the help of technologies such as mobile and online web based applications, which can empower women as well as other vulnerable community members to report cases pertaining to violence and harassment [60].

Violence against women is an alarming problem throughout the South Asia. Women are the victims of sexual harassment, rape, and honor killing just to name a few. Women as victim are at risk for further victimization under police custody. While many incidences of sexual and physical violence including rape have been reported under custody of law enforcement departments, it is likely that the majority of such cases are not even reported owing to fear of reprisal [82]. Therefore, it is important to ensure basic human rights for women and strengthen their access to law and justice system. The foremost thing to achieve this goal, is to increase awareness about national and regional violence against women laws. The more people (both men and women) know about the laws and supporting legal framework, the more they can claim their rights and support legal mechanisms. To this end, various ICTs initiatives and radio and TV programs can be leveraged to enhance community awareness regarding violence against women laws and the legal options available to the victims including government or NGO-supported shelter homes. National and provincial governments in Pakistan have started different initiatives to assist women victims of violence. For instance, at national level a toll-free helpline 1099 has been established to report human rights violations including violence against women [83]. Similarly, Punjab government established helpline 1043, which is supported by Punjab Commission on the Status of Women. Further, the Violence Against Women Center has been established in Multan City of Punjab to provide shelter and protection to women . Similarly, a special court is constituted at the Lahore judicial complex to deal with violence against women cases [84].

4.1.5. Participation of Minorities

To create a truly inclusive society, participation of minorities in all areas of society is indispensable. ICT-based community policing has the potential to give voice to minorities, and lower the communication barriers between different ethnic, racial, and religious communities thereby improving community safety and security. ICTs alone, however, are not sufficient to address the complexities of minority exclusion; they need to be combined with a number of non-technical activities to ensure their relevance. Police forces

are often composed of persons belonging to dominant segments of the community. In particular, women belonging to minorities have very limited representation in the police. Homogeneous composition of police force can lead to biased behavior towards certain minority groups, which in turn can lead to confrontational rather than cooperative behavior between the police and these communities. Poor relationships between minority communities and police have a profound impact on support for legal authorities and crime control [85]. Experiences show that inclusion of minorities can potentially increase efficiency of police force significantly, particularly when dealing with different ethnic and racial groups [86].

The religious and cultural context must also be considered while defining measures for improving participation of minorities in political, cultural, and social activities. To build trust and improve relationships with minority communities, it is important for police to reach out to minorities. In this regard, regular meetings and discussions can be organized between police and minority community members to build trust and facilitate the communication of issues and complaints. Feedback should be provided in terms of actions taken against complaints and justifications where complaints are not effectively handled.

The strategy for inclusion of minorities in police should be part of an overall government policy to empower minorities. An isolated strategy towards minorities is likely to be ineffective due to conflicting or inconsistent policies in other minority-related areas. To ensure equal access to police services and design comprehensive and coherent policies for minorities, meaningful consultation must be carried out to address their requirements considering specific minority context. Inclusion of police personnel recruited from the same minority group has positive impact on police-community relationship because they are more trusted by minorities compared to regular police officials [86,87]. Moreover, increasing representation of minority women, speaking same language, is paramount and can positively affect the relationship with minority communities. Demographic factors, such as gender, age, education, and race of police officials affect support for community policing [85]. Community policing strategy may prove to be effective in building and restoring good relationship between minority communities and police. This can be achieved when law enforcement agencies take care and respect cultural values and priorities [85,88]. Studies show that positive attitude of police personnel towards community oriented policing is correlated with positive attitude towards minorities [87,89].

4.2. ICTs for COP

4.2.1. Information Sharing

ICTs can facilitate police-community interaction through improved communication opportunities. The basic philosophy of COP encourages the development of bi-directional communication and constant dialog between police and community. ICTs can help to achieve these goals through online interactive applications, such as web portals, email and mobile alerts, microblogs, and social networks. For instance, after the explosion of bombs at the Boston Marathon, Boston police department used Twitter (a micro-blogging service) to inform the public about investigations, request assistance, correct wrong information propagated through press, and calm the nerves and stay restraint [90]. Afterwards, state and federal investigation agencies decided to *'crowdsource'* and ask the public for help to forward any media (e.g., videos and photos) or leads related to bomb attacks. Within few hours, thousands of photos, videos, and textual data was received that led to successful identification and arrest of the two lead suspects [91].

4.2.2. Improving Police-Community Relations

In COP, there must be continuous communication between the local community and the police department. The community should be consulted and fully involved in making important policy decisions. This will lead to greater transparency in decision-making. Moreover, in certain instances, the use of ICTs can enhance community confidence as well as success of COP efforts. Three large police departments in North America, Washington DC, Boston, and Toronto have used ICTs to improve police-community relationships and strengthen COP efforts [68]. For instance, Toronto Police Service (TPS) uses a networking strategy to 'humanize the police' and 'narrowcasting'. TPS uses Twitter and Facebook to build networks between citizens and police officials. TPS social media strategy supports bidirectional communication between police and citizens where both can share information and multimedia content. Similarly, Metropolitan Police Department in Washington, DC uses Facebook, Twitter, and YouTube for supporting specific tasks depending upon the case requirements to provide as well as receive information to and from citizens [68].

4.2.3. Leveraging Cellular Technology

Various innovative ICTs can be used to support COP. For instance, mobile technology can be used to provide required information to police officers on patrol that will enable them to engage more effectively with the local communities [92]. Moreover, this will enable police officers to be more proactive in street patrolling by concentrating on certain problem areas identified through community feedback. Similarly, social media can provide a novel communication platform to engage with citizens, share information, and address the issues that are relevant to certain localized communities. For instance, Greater Manchester police has been using Twitter to engage local communities and exchange various types of information, such as reports about criminal activities, information requests, and type of actions taken by police officers in a certain situation [93]. Latest developments in crowd sourcing and social networking applications can be effectively utilized to enhance COP efforts [68,90,91].

Technologies and applications that support community policing increasingly rely on cell phones that have become

ubiquitous in our daily lives. There have been initiatives in different South Asian counties that exploit cell phones to promote community policing. However, it is important to analyze the level of cell phone penetration in the given area before considering deployment of mobile phone-based applications. Table 4 provides an overview of current mobile phone penetration in different regions of South Asia.

The Table 4 clearly shows that cell phone penetration is more than two thirds of the population in all South Asian countries, with the proportion of mobile internet users comparatively lower. Currently, most mobile internet users belong to the densely populated urban areas, since rural areas lack high-quality mobile internet coverage. However, the number of mobile internet (3G/4G) users is expected to increase significantly in the next few years. For instance, 3G and 4G coverage in Pakistan is expected to reach 90% and 80% by 2020, respectively [94]. Similarly, LTE (4G) coverage in India is expected to reach around 84% by 2019 [95]. Mobile broadband has the potential to reduce the digital divide between urban and rural areas. With the rapidly growing penetration of mobile internet (3G/4G), internet access disparity between urban and rural areas is anticipated to diminish.

4.3. Factors Affecting ICTs for COP

There are certain factors, such as institutional capacity, resource availability, and institutional willingness that determine how well ICTs respond and contribute towards achieving the desired goals of COP. A significant proportion of policing procedures entails the data processing and efficient communication and dissemination of relevant information. ICTs can improve these procedures through improved data management and efficient communication systems. In a region like South Asia, where resources are limited, efficient utilization and better management of available resources becomes even more crucial. This fact is also acknowledged by many donor agencies, such as World Bank, UNDP, and UNESCO that view ICTs as a means to achieve more transparency and better data management that will contribute to better service provision [62,96]. Some of the factors that contribute towards the successful implementation of ICT based COP are depicted in Figure 2.

There have been many initiatives to inculcate COP in almost all the countries of South Asia, and some of them have proved more successful than others. COP in South Asia, however, has not in general been adopted as an organizational philosophy in police strategies. There can be multitude of factors behind the failure to adopt COP in police ethos. Some of the most prominent factors that affect widespread implementation of COP in South Asia are: **(a)** deficiency of trust between the community and police, **(b)** lack of conceptual clarity on the subject by police personnel, **(c)** strong resistance to change in current police culture, and **(d)** absence of long-term sincere commitment by the police department and government [31]. Implementation of COP is a long-term process that requires consistent police-community collaboration and partnership. Therefore, it is imperative to establish sustainable trust between police and community. There are number of factors behind the trust deficit among citizens, such as high rate of corruption, brutality towards citizens, lack of internal accountability, lack of political will and absence of oversight mechanisms [31]. The aforementioned factors need to be considered for sustainable implementation and adoption of COP in South Asia and ICTs can certainly help to overcome the challenges faced by COP.

Table 4. Mobile phone penetration in selected South Asian countries

Country	Total population [97]	Mobile phone users	Percentage of mobile phone user to population	Mobile internet users	Percentage of mobile internet users to mobile users
India	1354.05	1020 million [98]	75.33%	500 million [99]	42.74%
Pakistan	200.81	140.5 million [100]	69.97%	44.49 million [101]	31.67%
Bangladesh	166.37	140 million [102]	84.15%	60 million [103]	42.86%
Nepal	29.62	27 million [104]	91.14%	15 million [105]	55.56%
Sri Lanka	20.95	25 million [106]	119.33%	3.8 million [107]	15.20%
Afghanistan	37.37	25 million [108]	68.73%	2 million [106]	8.00%

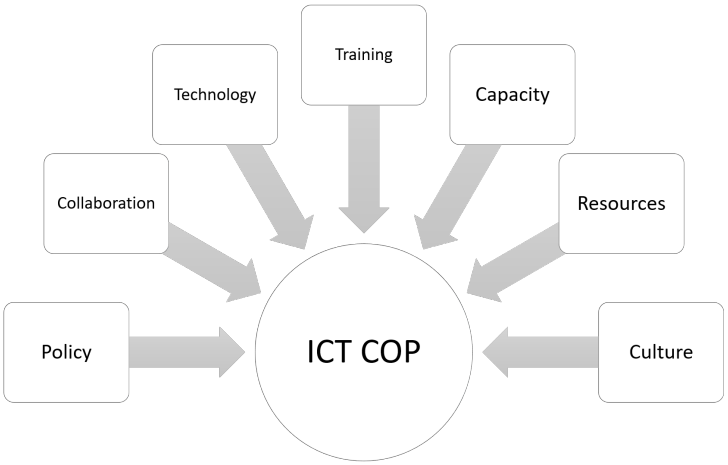

Figure 2. Factors affecting ICT for COP

5. Challenges in ICT-based COP?

Although there are a number of exciting opportunities for the use of ICTs in COP, there are also immense challenges in implementing ICT-based COP in South Asia. We have organized some of these challenges into three broad categories i.e. institutional, social and technical (see Figure 3). In the subsequent sections we briefly discuss how these challenges need to be addressed for effective implementation of ICT based COP in South Asia. Majority of the challenges presented in this Section are authors' own assessment based on scientific literature review. Moreover, some of the challenges were identified during our field surveys that include interviews of community representatives and focus group discussions conducted at the KP province, Pakistan. However, the list of challenges included here should not be considered exhaustive.

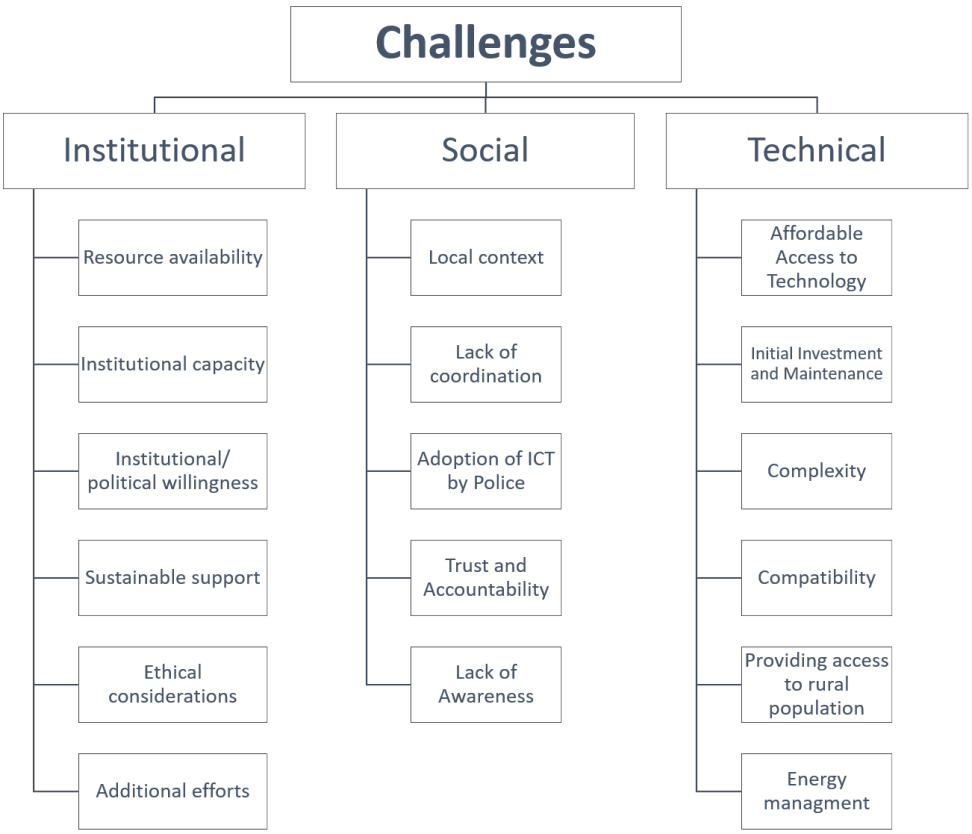

Figure 3. Categories of challenges faced by ICT-based COP

5.1. Institutional Challenges

a) Resource availability: The cost of resources plays a vital role in adopting any new technology. To implement ICT-based COP in initiatives (such as call numbers), a centralized system is needed to manage the required data. Such a system should also provide the necessary computing facilities required to store, retrieve, and process large amounts of data. To fulfill such huge storage and computational requirements, data centers could be established in different regions of the country. Regional data centers could provide services to multiple police forces of the region. Moreover, the regional data centers could be connected through high speed networks to create a large interconnected data center. To establish the data centers at regional and national level, financial support from national and local governments as well as international donor agencies could be sought.

b) Institutional capacity: In addition to technical resources, well-trained and motivated human capital is equally important for successful implementation of ICT-based COP. Even if a government provides the required computational resources, if the police staff is not trained to effectively and correctly use the resources then they will be wasted. Currently, most of the staff hired in police departments are not very well trained in using ICT tools. To address this issue, a two-pronged strategy could be adopted: **(1)** to hire new staff that are already trained in using ICTs; and **(2)** provide on-the-job training to existing staff that are motivated to learn how to use ICT tools for implementing COP. Likewise, there is often a lack of understanding of COP policy and practice – compounded by the fact that there is no single global definition of COP. This is partly due to the fact that social, cultural, and political values and contexts vary greatly, both nationally and regionally. Therefore, it is important for the police personnel to comprehensively understand what COP entails, and how to develop an approach to working with communities that is relevant for their context. In this regard, proper education and on-the-job training in how to understand and implement COP is important. Moreover, seminars and workshops should be arranged for the awareness of community. The awareness programs should include what are the benefits and goals of COP might be, and what is in turn expected from both the police and the local community to make the initiatives a success. It has been observed in many case studies that either police or community or even both may not fully understand the concept of COP and therefore are unable to carry out the required tasks [59]. It is in fact only when both the police and communities understand the concept and practice of COP, that ICT tools can be used to support their activities.

c) Institutional and political willingness: One of the most important factors that determines the success or failure of ICT-based COP is institutional willingness, especially from higher police management. A strong motivation and commitment from government and higher police administration is vital for success of ICT based COP initiatives.

d) Sustainable support: Implementation of COP together with the adoption of ICTs will be a slow process. It has been observed in many case studies that visible progress on such initiatives can take up to several years [109]. Therefore, strong sustainable support from higher police administration and political government is highly desirable [110].

e) Ethical considerations: Use of information technology in policing is expected to accumulate large volume of data pertaining to crime and criminals [111]. Moreover, use of ICTs in COP could as well generate contents in various forms, such as text, photos, and videos [90,112]. However, care must be taken to ensure anonymization of data to ensure protection of community members participating. Similarly, it is equally important to make sure that the data/information is not misused by any entity, neither police nor criminals. For instance, social networks generated through ICTs may be misinterpreted and can potentially lead to false inferences [113].

f) Additional efforts: Use of ICTs introduce complexities and additional demands compared to traditional police operations that may undermine the potential of ICTs to be successful. On the one hand, new ICT tools provide police greater access to information, on the other hand these tools often require extensive reporting from police in the field. The need for more reporting may negate the expected efficiency and can lead to lesser interaction with the community and engagement in proactive police work as well as create frustration among officials [114].

5.2. Social Challenges

a) Local context: It is important to consider the social and cultural values of local communities while developing COP. Otherwise, the local COP efforts are likely to fail. In the case of Hong Kong, Lau (2004) found that initial COP efforts failed mainly because an alien model, imported from America and Britain, was transplanted there without due consideration given to the local context. Lack of consideration of the socially and economically diverse population was a key reason for the meager achievement of local COP in Hong Kong. Ideally, national police institutions would, rather than implementing external models of COP, engage civil society in the development of locally appropriate COP approaches, which would, per definition, include activities such as community engagement, dialog and joint problem solving which would incorporate local contexts in the process.

b) Lack of coordination: There are different departments that come under the police, and different government ministries and agencies that are relevant to include in COP activities. How much and to what extent they coordinate and share data with each other is another challenge. To overcome this obstacle, a central authority could exist that would be able to integrate and coordinate COP efforts among various police and other government departments. There are examples of this, such as Brisbane's smart city project, that show that coordinated efforts are required. Moreover, there can be many opportunities for creative public, private, and social sector partnerships. A major drawback of having fragmented ICT-based COP efforts in different regions from various communities of society is not only the scarce technical resources, but human resources may be wasted through duplication. To achieve concerted efforts from various stakeholders, such as government agencies, community, and private sector strong networking among stakeholders is required.

c) Adoption of ICT by Police Personnel: In many cases of applying e-government, it has been observed that a critical factor in the success of such initiatives is the adoption or non-adoption of ICTs by the government officers [63]. In this regard, strong resolution by the upper tier police administration and motivation of ranked police officers can play a pivotal role.

d) Trust and Accountability: Establishing trust between police and local community, especially the minorities, has been a challenging problem. In cultures where a uniformed police officer is a symbol of fear rather than safety, establishing trust between community and police is even more difficult. However, ICTs could aid in achieving the trust where there is very little direct face-to-face interaction possible among the involved parties. Efforts to build online relationships with the citizens can provide basis for improving offline police-community interactions. Similarly, the actions taken by police management against complaints registered through ICT tools could be instrumental in building trust and gaining respect in community. In this regard, a transparent mechanism for citizens to track the complaints and follow up their cases would require an easy-to-operate ICT tool.

e) Lack of Awareness: A lack of awareness among public about the existence and working of COP could be addressed through public awareness campaigns in the media, seminars, and community dialogs.

5.3. Technical Challenges

a) Affordable Access to Technology: It is primarily the responsibility of governments to provide necessary infrastructure and equipment required to access the Internet. More developed areas such as urban centers may have sufficient technology available to access the high-speed broadband internet access. Many large and medium cities are as well covered by third generation (3G) cellular services. However, the less developed, rural areas may not have access to the same level of ICT infrastructure. Furthermore, the affordability of computing devices to participate in ICT-based community interaction is another critical issue for less developed areas of the region. This provides interesting opportunities for public/private partnership to provide computers and cell phones at low prices to people living in less developed areas.

b) Initial investment and maintenance: At the initial phases of project, it is desirable to develop solutions that require low initial investments by the government or police department. To this end, already available infrastructure should be leveraged to effectively utilize the available computational and communication resources at different organization particularly educational institutes. It is also critical to ensure that there is a plan for the maintenance of ICT systems, both in terms of hardware and software. A survey conducted by Gartner Research revealed that about two-thirds of the corporate IT budget is consumed by routine maintenance and support activities [115]. Cloud computing is a revolutionary technology that can be leveraged to significantly reduce the initial investment and maintenance cost of IT infrastructure. To ensure the security and privacy of sensitive data private clouds can be established by security agencies and police departments [116].

c) Complexity: The solutions developed for ICT-based COP should not be too complex and must be created as user-friendly as possible to allow early adopters to easily learn and effectively use required features of the system.

d) Compatibility: The developed solutions should be compatible with existing systems and technologies. A system that is designed to keep in view the technologies that are currently not in widespread use is likely to be rejected by majority of the population.

e) Providing access to rural population: Approximately two-thirds of the population in South Asian countries live in rural areas [117]. As we saw above, rural populations have limited access to ICT resources, such as computers, Internet, and cell phones. Therefore, it is critical to provide ICT access to rural populations for their inclusion and active participation in COP related activities. Various initiatives have been taken in the past to provide ICTs to rural populations in South Asia. For instance, "Public Access Internet Kiosks" have been established in remote villages of different states of India including Tamil Nadu and Madhya Pradesh. These kiosks are equipped with computers and Internet connection and are operated by local individuals having working knowledge of computers [118]. Another initiative was taken in villages of two Indian states to introduce ICT ecosystem for the Ma-

hatma Gandhi National Rural Employment Guarantee Act (MGNREGA) Project. The MGNREGA initiative includes information kiosks, internet connectivity, mobile phone service, and community radio to raise awareness among rural women. A salient feature of MGNREGA is that it ensures active and compulsory participation of rural women because 33% of jobs at any given worksite are reserved for women [119]. In conflict and post-conflict societies, women do not have equal access to technology. This divide is even more evident in rural population. Therefore, there is need to introduce similar initiatives in other countries of the region with certain modifications, such as self-operated kiosks with local language support, touch screen computers or mobile phones, community radio service, and female operators to assist and train women for using ICT resources.

f) Energy management: Developing, deploying, and using ICT applications need computational resources. All computational resources, either back-end high performance computing servers or front-end devices such as PCs, laptops, and mobile phones, require energy to operate. Reducing and optimizing energy consumption of computing resources has received focus of research community in the past decade. Energy efficient ICT tools and use of solar and other renewable energy production would be needed for successful operation of ICT tools in remote areas.

g) Environmental and Health Security: Human security and environmental security are certainly related. However, the relationship between human and environment security is somewhat complex. Human security is linked with the availability of natural resources and is greatly affected by environmental vulnerabilities. On the other hand, environmental change is both directly and indirectly affected by conflicts and human activities [120]. In particular, climate change is contributing to unprecedented natural disasters in the form of floods, hurricanes, and earthquakes are being witnessed. Such catastrophes impact human livelihoods and quality of life [121], and ICTs have a potential role to play in responding to these to contribute to human security. However, there are several studies that also investigate possible negative effects of ICTs [122]. Throughout its lifetime, ICT hardware can affect human health and environment. Starting from the manufacturing stage, required raw material (e.g., precious metals) are mined under deteriorating environmental conditions. During their usage, ICT hardware consumes significant amount energy that results in CO_2 and green house gas (GHG) emissions. Moreover, disposing and recycling of ICT hardware as e-waste in landfills or disassembling at the end of its life-cycle have negative impact on the environment [123]. In contrast to general municipal waste, certain components found in electronic waste contain toxic materials that can cause serious threat to human health and environment [124]. Further, thermal effects of high Non-Ionizing Radiation (NIR), emitted by wireless communication devices, can cause health damage [125]. Therefore, it is important to carefully analyze the impact of ICT products and services on the human health and environment [125], and explore new, environmentally safe technologies as alternatives.

6. Conclusions

Successful implementation of ICT-based COP in South Asia can effectively enhance police-community relations and citizen participation in policing. This can lead to trust-building, and improved police efficiency in reducing crime, fear of crime, and terrorism. However, it is not easy to introduce ICTs in COP especially for developing regions such as South Asia. In this article, we have reviewed the current state-of-the-art related to implementation of ICTs for use in COP in developed countries and what lessons can be learned by developing countries from such projects, highlighting some of the significant challenges for implementation of ICT-based COP. Although there are certain initiatives being undertaken in some countries of South Asia, there is still a long way to go. Nevertheless, it is recommended to gradually integrate ICTs in COP initiatives in order to ensure they are appropriate and accepted. In this regard, readily available technologies, such as computers, internet, and mobile phones can be used to develop user-friendly systems keeping in view the local context. Embracing ICTs for COP can give rise to many interesting opportunities, such as use of social networks, inclusion of women, and inter-agency cooperation to achieve the desired goals.

Although ICTs hold great potential for improving policing practices, care must be taken while selecting or developing such technologies. Questions must be raised as to what extent these technologies can improve human security by analyzing the impact of these technologies on police efficiency as well as privacy and well-being of citizens. Adoption of ICTs alone do not always lead to obvious and easy enhancements in police productivity, management, communication, and building of trust with communities; they need to be combined with people-focused COP approaches which can address the complexities and diversity of local contexts. More research is required in each case to analyze which organizational strategies including implementation, management, training, and evaluation are critical to achieve desired objectives with ICTs and at the same time avoid negative, unintended consequences. In fact, new ways of evaluating ICT use in COP need to be developed based on local criteria together with civil society to be sure that a set of common objectives emerges. Typically, ICTs should only be used where they enhance human security—care must be taken to ensure that they do not allow for the targeting of vulnerable populations.

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