Canada

An Overview of Resource Allocation Models in a Selection of Large Canadian Police Services
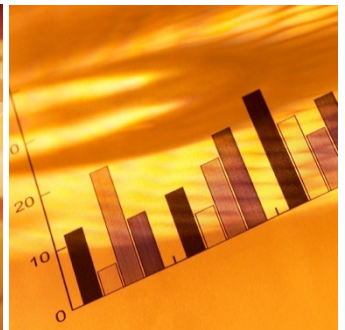
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BUILDING A **SAFE** AND **RESILIENT CANADA**

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Abstract

This report examines the major police staffing and deployment models used in Canada by the Royal Canadian Mounted Police, Ontario Provincial Police, *Sûreté du Québec,* and *Service de Police de la Ville de Montréal.* The *Ministère de la Sécurité publique du Québec'*s approach to permanent minimum staffing levels for police organizations is also reviewed. The basic forecasting approach is based on an objective methodology and historical quantitative data. Definition of the mandate and identification of the policing functions are key components to determining the decisions. A critical step is the development of a conceptual model showing the parameters affecting service offering and the causal links between the variables impacting workload. The organizations use recent workload data while, in some cases, also analyze past trends and historic agreements. The human resources aspects are essential elements of the planning. The scope, nature and trends in crime are critical factors. The social and historic context, along with the characteristics of the population and territory, influence the determination and allocation of resources. The relative importance assigned to these parameters, and their inclusion in the model varies over time and police services. Several elements identified in this review could be replicated by other police services seeking to modernize their approach to resource allocation.

Author's Note

Acknowledgements

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Introduction

Background

Over the years, police work has become increasingly complex and diverse. Canadian communities as well as police services need to know how many police officers are required to ensure public safety and help their agency to most cost-effectively meet the demands placed on it, in the face of increasing costs and shrinking revenues. Police services are experiencing unprecedented pressure to reduce costs and demonstrate fiscal accountability (Griffiths et al, 2015). In the policing field to-date, however, "much attention has been given to police recruitment, retention, and, in this economic context, how to maintain police budgets and existing staffing positions. Less has centered on adequately assessing the demand for police service and alternative ways of managing that demand" (Wilson and Weiss, 2012: 1).

An increasing number of Canadian police organizations have tried to improve their approach to determining human resource requirements and allocate appropriate human resource levels in order to offer appropriate policing services to provinces, territories, municipalities, and First Nations communities. Their goal is to determine the number of police officers required, as well as the most optimal deployment approach as a function of work period, day of week, and geographic area, in order to meet the demand for high quality policing services (Couillard, 2001: 10). These decisions are based on a particular vision of policing, organizational mandate, and expected roles.

A number of the police staffing models used across the country were examined at the "Canada Police Staffing Symposium" hosted by the Ontario Provincial Police (OPP) on November 2-3, 2015 in Ottawa. This symposium provided an opportunity to discuss how Canadian police organizations are addressing critical staffing issues. A range of patrol allocation and deployment approaches were explored during this event. Some key findings were identified in order to help to guide future efforts. Based on the presentations given at this symposium, it was clear that data-driven strategies were applied to decision-making regarding policing resources. There have been significant efforts to manage the demand for police services. Also, according to the Final Summary Report prepared for this event: "there should be an effort to conduct evaluations of the initiatives underway to test alternative staffing models… it is critical that other communities learn about these projects and their strengths and weaknesses" (Weiss, 2015: 14).

The Community Safety and Countering Crime Branch (CSCCB) of Public Safety Canada (PS) aims to complement the OPP-led symposium with the current study, which examines the advantages of, and limitations to, some of the major police staffing and deployment models used in the Canadian context. It also provides suggestions for ways to address the limitations identified. Specifically, this study identifies key success factors as well as the conditions of model development and adaptation to local needs and contexts. An enhanced understanding of what is required to better plan and manage staffing resources should lead to an improved utilization of more effective strategies to meet community requirements for policing services. PS aims to increase community safety and counter crime in Canada by providing police services with information that can be used to improve the efficiency and effectiveness of their deployment models.

Methodology

The current research project involves an examination of a sample of models that have been developed by Canadian police services and the *Ministère de la Sécurité publique du Québec*'s approach to police staffing resources allocation. Presentations made at the OPP's 2015 symposium were complemented by a comprehensive set of public documents originating from governments and law enforcement agencies

(annual plans, annual reports, environmental scans, research studies, etc.). Internal research documents prepared by those agencies in collaboration with academic researchers were shared with PS to build a deep understanding of the models implemented or in development. Structured questionnaires were designed to complete the document review with complementary information collected from research directors, managers and analysts working in these organizations. Face-to-face meetings, conference calls and e-mail exchanges were used to develop a better understanding of staffing and deployment models developed by a selection of large Canadian police services: the Royal Canadian Mounted Police (RCMP), the Ontario Provincial Police (OPP), the Sûreté du Québec (SQ) and the Service de Police de la Ville de Montréal (SPVM) which have recently reviewed their approach to police resource allocation and deployment. Through conference calls and e-mail exchanges, the study also aimed to understand how the MSP approve police minimum staffing levels. This exploratory study aims to answer the following key research questions:

- How are police officers allocated across units to do policing?
- Which staffing and deployment models are being applied? What are their basic assumptions, key components, parameters, and sets of metrics?
- When planning the deployment of police officers, how do Canadian police departments take into account the following factors: operational demand, strategic direction, crime and homicide rates, and socio-demographic or economic factors?

Results

Description of Canadian Police Resource Allocation Models

Approaches and Modelling Methods

The development and use of resource allocation models is still fairly recent in Canadian policing. Law enforcement administrators have access to multiple approaches, ranging from simple to complex ones, each with a range of advantages, disadvantages, and assumptions (Weiss, 2015). Four approaches to staffing allocation are generally used: Per capita Approach, Minimum Staffing Approach, Authorized Level Approach, and Workload-Based Approach (Wilson and Weiss, 2012). The per capita approach estimates the required number of police officers based on an optimum officer rate and population data. There is no generally accepted standard for the optimum number of officers by population. Some law enforcement agencies and police organizations predetermine minimum staffing levels based on past practices, professional judgment as well as knowledge of the policing and environmental context (including area, population and crime trends). Other organizations use an authorized level approach to identify the number of officers that could be allocated based on budget allocations. The authorized level is a benchmark that can be fixed through a formal staffing assessment considering resource availability and political decisions. Finally, the workload-based approach is evidence-based: staffing levels are derived from a systematic analysis of the actual or past demand for service. Data sources are generally call for service (CFS) forms/cards, incident reports, operation case records, while complementary data is sometimes collected through interviews or structured questionnaires.

In order to estimate actual staffing needs and predict future requirements, varied forecasting approaches are available based on objective methods using quantitative data, or subjective methods using qualitative data (Couillard, 2001: 6). Forecasting processes are based on the assumption that history will repeat itself. Subjective methods, for instance Delphi, analogy, focus groups, and brain storming, are appropriate when no accurate and reliable quantitative data are available. The objective methods generally require reliable

historical or survey data. Among these techniques, multiple regressions and pattern fitting methods such as naïve forecasting, exponential smoothing, double exponential smoothing, decomposition models, and ARIMA (Autoregressive Integrated Moving Average) extrapolate past data to predict the future. Some quantitative methods identify cause and effect relationships between a dependent variable and independent variables, for example the number of officers required and CFS. The next section of the report presents the deployment and staffing models that are used by a sample of Canadian police services – at the national, provincial (Ontario and Quebec) and municipal (Montreal) levels – as well as their development process. Further, the report also describes the policing context, police organization plans, and presents the adequacy between police staffing needs and police training in Quebec.

Sample Models Used in Canada

Royal Canadian Mounted Police: General Duty Police Resourcing Model (GDPRM)

The RCMP's mission is to serve as Canada's national police service, preserving the peace, upholding the law and providing quality service in partnership with its communities (RCMP, 2010: 37). The RCMP provides federal policing service to all Canadians and, under contract, policing services in all but two provinces (Ontario and Quebec), in three territories, approximately 200 municipalities, and hundreds of Aboriginal communities. "One of the most significant aspects of the contracting process is the determination of the number of human resources required to offer appropriate policing services and the number of support resources (…) that are required to maintain that complement of front-line police officers." (Couillard, 2001: i).

The GDPRM is a RCMP developed computerized simulation that assists in the workload analysis of the general duty / first responder resources at a given detachment. The model uses RCMP historical empirical databases, as well as other detachment specific data (dispatch and shift schedule), to simulate the CFS within a detachment at any given time period, and the associated response, in terms of Initial Investigation, Follow-up, Court and Disposition activities undertaken by general duty / first responder resources. The analysis provides concrete intelligence-led information about front line calls for service, proactive time and several other workload parameters to assist in the determination of resource levels and the strategic allocation of these resources. The model can estimate the general duty / first responder resources required based on operational data input and various resourcing scenarios. By varying the value of workload parameters or decision criteria, the model allows for different resourcing scenarios to be analyzed.

The RCMP had previously used several planning methodologies to determine human resource requirements and to allocate approved human resource levels before conducting a feasibility study in 2000-2001. This study which was prepared by Couillard (2001) for the Resourcing Task Force of the RCMP aimed at developing an acceptable approach to meet the needs of all stakeholders. The research was based on meetings held between 2000 and 2001 with the members of the task force, documentation on existing police resourcing methodologies and Statistics Canada Juristat crime reports.

In order to determine if existing models could be used with some changes or if a new model must be developed, seven police resourcing methodologies were evaluated to assess their strengths and weaknesses. Five of these models were compared to the same set of criteria, including three from the RCMP (K Division Model, PARR Model and SARPLE Model) and two from the OPP (Workload Analysis Model and Deployment Model). The RCMP's DHRM and STEER models, both based on the SARPLE methodology, were also examined.

The feasibility study involved a descriptive analysis of the RCMP's police services (reactive time, proactive time, operational and administrative overheads). A conceptual model of the RCMP Police Services Delivery was designed to highlight the random nature of the demand for police services and the

factors influencing the demand. Also, a conceptual model of the RCMP Police Services Delivery was developed which identified the main factors influencing detachment workload including variables related to calls for service (clients' expectations, geographic, demographic and economic variables) and factors linked to reactive time such as type of activity, call priority, police officer safety and follow-up required. The framework also incorporated the detractors (vacations, maternity leave, sick leave, etc.) which must be taken into account as well as policy and expectations regarding proactive time (Couillard, 2001: 10-11). Afterwards, the study determined to what extent the existing methodologies could adequately consider all essential factors needed to forecast the demand for service. A high-level and three-step process model (Workload and Police Officer Availability Forecasting, Resource Reallocation, and Service Level Estimation) was then used to show management activities, essential inputs and outputs.

According to the feasibility study: "while the actual RCMP police resourcing methodologies used sound concepts, it seems that they need to be updated and integrated into one single methodology" (Couillard, 2001: 45). None of the existing methodologies reviewed possessed all of the characteristics that were needed, so a new "unified and force-wide" Police Resourcing methodology needed to be developed. The 'black box' models that had been analyzed were calls for service based and used 1980s technology. The new model needed to be flexible, thorough and defensible (i.e., mathematically sound, understandable and reproducible), taking advantage of new technology and the easier access to workload data (Vignault, McDonald and Day, 2015).

The feasibility study determined that macro-level regression models could be used to estimate an appropriate number of police officers based on forecasts of the total criminal code cases, total demand for service and population size. The regression equations based on past data were significant and the forecasting errors low; however, the researcher noticed that past might not reflect future changes in the policing service delivery environment whereas such methodology could not take into account the safety of police officers. As a result, sample mathematical programming models were also created (a non-linear integer-programming model) for resource allocation and to develop work schedules.

The RCMP collaborated with the OPP to develop a national police resourcing model (GDPRM) aiming to determine options for human resources required to provide policing services, at any given contractual location, in a timely manner (RCMP, 2010: 33). In 2005, the RCMP officially implemented the General Duty Police Resourcing Model (GDPRM) as a computerized discrete stochastic simulation model designed to estimate the number of frontline, general duty (GD) police officers required for a detachment and to assist in contract negotiations (Weiss, 2015: 8). In 2009, the International Association of Chiefs of Police recognized the model with an award for excellence in law enforcement research and development (RCMP, 2010: 33). Two other PRM are currently being created by the RCMP: the Federal Policing Resourcing Model (Fed PRM) and the Forensic Identification Resourcing Model (FIRM).

The GDPRM addresses a critical question in resource deployment, seeking to develop reliable estimates of how much time is devoted to CFS (Weiss, 2015: 8), depending on the CFS and the tasks performed (investigation, follow-up, court, case disposition). The tool is one of many that are used to analyze the workload. The model helps to estimate the staffing levels required to provide general duty, frontline policing services in detachments and enables the organization to respond more effectively to community needs while using resources as efficiently as possible. The GDPRM is a tool to estimate general duty first responder resource requirements rather than an RCMP standard.

The model is based on detailed RCMP detachment-specific data, is dynamic and allows for "what-if" scenario analysis. The GDPRM replicates the daily activities of a detachment through a simulation which determines if resources could meet demand for service (workload), given scenarios, percentage priority response and percentage core proactive time. A workload-based staffing analysis is conducted, which looks at the nature of CFS, calls priority and their distribution by hour, day and month; estimates the time spent on CFS (all steps including zone and travel time); calculates the agency shift-relief factor;

establishes performance objectives and gives staffing estimates. Input changes are tested one at a time to see the overall impact. The simulation is also based on GD police officers, the shift schedule, available hours, call out, as well as back-up and assistance. Detractors are a calculation of time where members are taken away from their regular work hours per year. Circumstances where a member is not available for response to call such as annual leave, statutory holidays, training, sick leave, paternity/maternity leave and transfers are considered detractors. These aforementioned factors are considered and calculated in the GDPRM resource analysis. The detractor hours are removed from the total regular working hours to provide a more accurate availability of actual general duty / first responder resources.

The GDPRM provides an event distribution based on historical data (number of events by type of events, events by hour of day for entire week, events by zone). There are two ways to run the model. Users specify the criteria to achieve (minimum percentage of priority calls to be dispatched immediately, minimum percentage of core time-proactive) then the GDPRM estimates the number of GD police officers needed to meet those requirements. Users could also specify the number of GD police officers, and the model produces the percentage of calls dispatched immediately, by priority and percentage of core proactive time that remains once those calls are responded to.

Trained GDPRM analysts consider other factors and workload issues that are not directly incorporated into the model but used as background information. The impact of environmental changes on resourcing (policy changes, legislative changes, changes in procedure, population growth, and seasonal events) are considered as well. The RCMP's policy center is in charge of data quality control, audits, reviewing raw data and reports. After the initial support, raw data and reports are reviewed as needed. Training sessions are organized when required (retirements, new employees, etc.) to teach how to prepare, enter and analyze data and output.

The tool is considered to be a division/regional planning tool which estimates RCMP service delivery options. Reasonable expectations of service delivery are estimated for a given number of resources. Human resource requirements are not dictated but rather they are negotiated through discussions with contracting partners and stakeholders.

The RCMP aims to continuously improve the GDPRM. The tool is updated as needed to reflect changes in time standards, legislation and policy. Time standards are regularly updated by a rotation of members from across the country through workshops and focus groups coordinated by the GDPRM support team.

Ontario Provincial Police (OPP): Deployment Model

The OPP is a division of the Ministry of Community Safety and Correctional Services and delivers frontline policing services to more than 70% of Ontario's municipalities.[1] The OPP is unique among Ontario police services in that it is legislated by the *Police Services Act* (PSA) to carry out municipal as well as provincial policing responsibilities.[2] Currently, the OPP delivers policing services to 323 municipalities on a cost-recovery basis. The organization provides varying levels of programs and services, such as criminal investigative, technical expertise and leadership to communities, and supports municipal and regional police agencies in Ontario (OPP, 2015: 5). The decision of how to staff each detachment with constables for frontline duties is supported by the Deployment Model.

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[1] There are about 58 municipal police services and nine self-administered First Nations police services in Ontario.
[2] *Police Services Act*, R.S.O. 1990, c. P.15.

The Deployment Model currently used by the OPP is an adaptation of the Illinois State Police's computerized deployment model (Raub and Sweat, 1981). A distinct advantage of this model over previously introduced staffing models is that it provides adequate estimates of staffing requirements for rural areas (Weiss, 2015: 6) and not only for urban areas. It is seen as an important tool to accurately identify the number of frontline constables required to address CFS. The model assesses the effect of devolutions upon detachment staffing requirements based on the following parameters:

- characteristics of the detachment (either area detachments with community policing or linear detachments);[3]

- officer availability (rest days, vacation, statutory holidays, court, training administration, etc.);

- CFS/Response standard (hours to investigate criminal or traffic occurrences, and response standard, as per the ministry's Policing Standards Manual);

- officer's safety standards (mandatory safety standards to ensure officer safety and back-up requirements); and,

- patrol standards (number of officers to conduct patrol).

The OPP Deployment Model strives to manage the tension created by the application of consistent standards within a diverse environment. The diverse environment of communities receiving OPP services is one of the key challenges faced by the OPP (Weiss, 2015: 6); consequently, the model considers individual detachment characteristics, including geography. Additionally, for the OPP "scanning for a holistic view of the environment goes beyond crime and includes examining political, economic, social, technological, legislative and demographic trends" (OPP, 2014: 7).

In spring 2016, the OPP's Business Management Bureau and the OPP's Regional Commanders began an exercise to compare the results of the Deployment Model across all detachments in Ontario. Detailed parameter data of each detachment was examined as well as other factors not considered in the Deployment Model (e.g. accommodations, specialty programs - i.e. Marine Patrol). For instance, hours the detachment is opened, minimum staffing level expected by community, scheduling, number of people to serve (population size), volume on the highway (for linear detachments).

Updates to the Deployment Model were made concerning most recent population and pertinent highway information. Side by side comparisons of workload measurements were done, the number of calls as represented by offences in the Niche Records Management System compared against the same reported as represented by Daily Activity Reporting (DAR) data, for consideration by those responsible for staffing at a local level. All of the information is considered by Regional Commanders when comparing the Deployment Model's results to the current staffing at each detachment. Other items for consideration are specialty designations managed at a detachment level. The OPP's Business Management Bureau (BMB) is committed to updating and examining the factors used in the Deployment Model on an ongoing basis to ensure the information provided is reliable. It will continue to be useful in assisting the organization personnel in estimating frontline resource requirements.

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[3] The OPP uses the term "area detachment" to describe regular detachments and "linear detachment" for traffic (highway) detachments.

Quebec Ministry of Public Security

Police Services in Quebec

There are four types of police organizations at work in Quebec: the municipal police forces (MPFs); the First Nations police services[4]; the SQ, which plays various roles; and the RCMP, which falls under PS Canada and has federal responsibilities. The MPF are under the responsibility of the municipalities and regional county municipalities (RCM) while the SQ falls under the government. The PA stipulates that the territory of a local municipality must be under the jurisdiction of a police service.[5] The activities of police services are divided in four categories: policing, investigations, emergency measures and support services. Police organizations must provide police services in accordance with the level applicable to them for the territory they serve depending on the population size (see the Table 1).[6] Each level of service includes the services of the lower levels. "The complexity of these activities increases according to service level of the police body. For example, a police body of level 1 can control a peaceful crowd whereas police bodies of service levels 5 and 6 will have to control crowds showing high risk of agitation, uncontrolled behavior or riot." (Ministère de la Sécurité du Québec, 2016). In addition, the PA stipulates that local municipalities forming part of a metropolitan community or a census metropolitan area must provide level 2 services or services corresponding to a higher level, according to the population to be served.[7] As of December 31, 2015, the total number of MPFs in Quebec was 29. The SQ is responsible for providing police services to municipalities with fewer than 50,000 people, with exceptions (Drummondville and Saint-Hyacinthe) in accordance with agreements with the municipalities or RCMs. The SQ provides higher level services to those offered by MPFs, including level 6 services. It supports MPFs as needed and also performs highway surveillance.

Table 1: Levels of police services to be provided in Quebec based on population size and information on the number of municipal police services

Service levels	Number of inhabitants	Number of municipal police services (as of 2017/05/19)
Level 1	Less than 100,000 inhabitants	7
Level 2	100,000 to 249,999 inhabitants	17
Level 3	250,000 to 499,999 inhabitants	3
Level 4	500,000 to 999,999 inhabitants	1
Level 5	1,000,000 inhabitants or more	1
Level 6	Sûreté du Québec	N/A

The staffing and staff deployment processes are achieved by each police service. Furthermore, the MSP is not in charge of resource allocation for the MPFs and SQ. However, Quebec's Minister of Public Security approves a permanent minimum staffing level for each MPF based on the analysis of police organization plan that have been submitted. The MSP provides strict application of the associated legal and regulatory framework, which contains the PA, in cooperation with the police organizations and the municipalities. Police organization plans are used to ensure that all police services set out in the *Regulation respecting the police services that municipal police forces and the Sûreté du Québec must provide according to their*

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[4] These police services created under sections 90 to 103 of the *Police Act* (PA) are generally created on the basis of tripartite agreements between a Band Council, the Government of Quebec, and the Government of Canada.

[5] Pursuant to the CQLR, ch. P-13.1.

[6] Policing services corresponding to each level of service are included in the *Regulation respecting the police services that municipal police forces and the Sûreté du Québec must provide according to their level of jurisdiction* (*Police Act*, chapter P-13.1, r. 6). See http://www.securitepublique.gouv.qc.ca/en/police-prevention/police-service-levels.html for a comprehensive list of services for each level.

[7] Pursuant to the section 71 of the PA.

level of jurisdiction are provided by police departments and to determine the minimum number of permanent police officers required so the municipal police department can provide all the required police services.

The MSP analyzes police staffing needs on an annual basis to determine the number of new police officers to train in Quebec. This analysis, in the form of a working document updated annually, is based on data collected in a questionnaire filled out on December 31 of each year by municipal police bodies and the SQ. The analysis is included in a report submitted to the *Comité de concertation sur la formation des futures policières et des futurs policiers du Québec*[8] [Consultation Committee on the Training of Future Quebec Police Officers]. Coordination between workforce planning, staffing, deployment and training is ensured. It should be noted that the analysis of police organization plans and the analysis of police staffing needs to determine how many new police officers to train are two completely different processes that do not share the same objective. The following sections will more closely examine all of these components.

Police Service Organization Plan

The PA stipulates that municipalities must submit a police service organization plan for approval by Quebec's Minister of Public Security, demonstrating how the police organization serving the municipality will provide the services associated with the required level of service.[9] The municipalities must update their police service organization plan as needed or at the Minister's request by once again setting out that the municipal police organization serving the municipality provides the police services for the required level set for that jurisdiction.[10] The MSP guide municipalities and police services in the preparation of this document to ensure that plans are consistent.[11] The MSP present all the factors to be described in the plan, which is then used by the MSP to approve minimum permanent police staffing levels. Generally, the format of the plan is more or less the same for all police services, but the content varies based on the realities of the territory served by each municipal police force. According to the MSP, to be able to fully achieve its mission, and integrating the community police approach into its operational and management practices, the police service must provide the police services which correspond to its respective level.[12]

As described in Table 2, a number of factors are considered through an analytic process based on quantitative and qualitative information. The template provided to police services presents the factors that must be described without providing any standards for measurement methods, indicators or targets, because police activities are achieved in varied contexts and the organization of police services is adapted accordingly. As a result, the relative importance of the factors is not fixed by the MSP and each plan is specific. The factors include: the implementation of the community policing approach; the territory served; the population to be served; criminality[13]; the organization of the police services; the staff and their distribution within the service to policing, investigations, emergency measures and support services; the workload; the number of patrol officers; the number of CFS requiring officers to travel and the

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[8] According to an agreement (from 2014-10-27 to 2017-06-30) between the MSP, the Ministry of Education and Higher Education (MEES), and the *École nationale de police du Québec* (ENPQ) [Quebec Police College], 12 representatives from these organization form the committee: MSP (2); MEES (2); ÉNPQ (2); SQ (1); SPVM (1); *Association des directeurs de police du Québec* (ADPQ: 1); general and vocational colleges (CÉGEPs) offering a program in police technology (public colleges: 2 and private colleges: 1).
[9] Pursuant to section 353.12 of the PA.
[10] Pursuant to the section 81.1 of the PA, "Municipalities update, as required or upon the Minister's request, their police organization plan, establishing, once again, that the municipal police organization serving their municipality provides police services at the required level. The plan is submitted to the Minister for approval upon his request."
[11] Previously, it was more difficult to perform an overall analysis and comparative analysis because of the great diversity of information provided.
[12] The departmental policy on community police in Quebec was published in December 2000 (MPS, 2000).
[13] A section of the police organization plan deals with crime statistics within the territory, the frequency and type of crimes. Police services include statistics and an analysis of these matters.

average response time to those calls; the number of socio-community workers employed by the police service; the infrastructure and equipment available to the service.[14] An analysis is conducted on how each service is delivered (human resources and materials allocated, equipment required and training completed) based on qualitative and quantitative data provided by the police service.[15] Information on the police organization's priorities and socio-economic factors are also among the factors taken into account in police service organization plans. However, each police service is autonomous in how it distributes its staff, as long as that distribution enables it to provide all the required services for its service level.

Table 2: Detailed list of the main factors analyzed in the police service organization plan to establish permanent minimum staffing levels for each municipal police service

INFORMATION GATHERED THROUGH THE POLICE SERVICE ORGANIZATION PLAN
Description of the territory
Characteristics of the territory that may have an impact on patrol sector boundaries or an influence on how calls are handled, such as: size of territory/area, number of kilometres of roads and off-road trails, navigable waterways and presence of forests
Description of the population to be served
Number of inhabitants, population growth trends (positive or negative), trends affecting the seasonal or tourist population
Description of crime
Reported and initiated crime, known and reported delinquency, hidden and under-reported delinquency, trends in crime, new forms of crime, presence of street gangs or other criminal groups in the territory being served, classification of crimes by nature and by service level
Description of other problems related to peace and good order
Crime on the territory served (presence, description and statistics, analysis), road safety (number of *Highway Safety Code* incidents and violations), facilities facing problems which disturb the peace or residents' peace of mind
Organization of police services
- Hierarchy, number and distribution of police and civilian resources, workload for each category of activities (policing, investigations, emergency measures and support services), number of calls requiring travel and average time allotted to respond to calls (policing) - Information on specialized units or programs, police infrastructures and equipment - Implementation of elements related to the departmental policy on the community approach: proximity to the citizens, partnership with other institutions, problem-solving approach and reinforcement of preventive measures
Distribution of staff, general and specific structure of the police service
Number of permanent civilian and police positions (filled and vacant), current or anticipated staff by group (executive and non-executive), divisions, units and types of positions (sergeants, officers, detective lieutenants and detective sergeants, etc.)
Presentation of activities by service level
- Description of how each activity is performed, the human and material resources allocated or not allocated to carry out the activities related to the police service's level - Specialized training activities - Equipment available

Source: Quebec Ministry of Public Safety.

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[14] The MSP is not specific regarding how this is to be measured. As an example, CFS and workload must be described but their measurement methods are not standardized.
[15] The analytic method is not standardized.

Once the analysis has been completed, the Minister authorizes a minimum workforce for each MPF, which is proposed by the police service. According to section 73 of the PA, a municipality that wishes to reduce the size of its police service must first obtain the Minister's approval. The police service organizational plan is not a strategic planning in which the police service sets objectives and targets to achieve or to "measure". The Minister of Public Security analyzes all the information provided to ensure that all police services stipulated are provided by the police service, in particular based on the specific characteristics of the population and the territory served.[16] The way the services are organized depends on the specific realities faced by the police service. The police service must therefore demonstrate in its organizational plan that it is able to provide these services and has the minimum staffing levels required to do so. As each police service organization plan is different and adapted to the realities of the community, the relative importance of each factor cannot be set. For example, the MSP's analysis establishes comparisons between police service organizational plans of the same level of service, but not a set threshold, since the realities of municipalities served in Quebec are likely to vary. This is how the Minister approves a minimum permanent police staffing level.

Analysis of police staffing needs in Quebec to determine the number of police officers to train

The SQ and MPFs must also provide the MSP with information on a yearly basis using the *Questionnaire sur l'administration des activités policières* [Questionnaire on Administration of Policing Activities], established in 1999 and implemented annually. This tool makes it possible to record, as of December 31 of a given year, the number of authorized permanent positions (police and civilian), the number of actual permanent and casual temporary police officers, the number of permanent police officers hired during the current year and the number expected to be hired the following year (see Table 3). Information on the officers' number of years of service, sex, age group, and level of education is also collected. The questionnaire also collects data on the number of permanent police officers on loan, officers who have left permanently (for retirement or other reasons) and those who will be eligible for retirement the following year. Other questions focus on permanent civilian staff and casual temporary police officers. Casual temporary police staff make it possible to maintain required service levels, while respecting the minimum workforce set out in collective agreements for police, thanks to the temporary hiring of police officers during summer or to replace permanent officers on leave or on loan to the ENPQ, regional mixed squads, or international organizations. However, the number of casual temporary police officers required is difficult to anticipate and is not subject to specific authorization from the MSP.

Based on the information obtained by the *Questionnaire sur l'administration des activités policières*, MSP conducts an annual analysis of police staffing needs. In this analysis, contextual factors are also taken into account to determine hiring needs as realistically as possible. The MSP looks at the overall trends in labour force needs of police organizations to support the planning, in general, of the number of police officers to train in the coming years. MSP has not set specific objectives, targets or indicators.

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[16] Stipulated in the *Police Act* and the *Regulation respecting the police services that municipal police services and the Sûreté du Québec must provide according to their level of jurisdiction.*

Table 3: Detailed list of main factors analyzed to determine the number of new police officers to train in Quebec

INFORMATION GATHERED USING THE *QUESTIONNAIRE SUR L'ADMINISTRATION POLICIÈRE*[17]
- Numbers of actual and authorized permanent police officers, by age, sex, and years of service - Number of police officers in senior management positions by sex and years of service - Number of police officers from visible and ethnic minorities - Number of temporary police officers - Number of authorized permanent police officers employed by activity sector (direction/administration, policing, investigations, support services and emergency measures), age, sex, and years of service
Number of police officers hired during the current year and number expected to be hired the following year
Number of police officers deployed on loan
Number of police officers who have permanently left to retire or other reasons and number of officers eligible for retirement
BACKGROUND INFORMATION TAKEN INTO ACCOUNT IN THE ANALYSIS OF POLICE STAFFING NEEDS
Demographic factors
- Comparison of the growth rate of the police service with the growth rate of Quebec's population - Population aging (police retirements)
Macro-economic situation
Financial capabilities of the government and municipalities, changes to legislation (act to amend pension plans)
Historical trends in the police service
Changes in labour force needs over the past ten years, variation in actual police service and departures
Factors related to police training
Enrolment capacity of training institutes and quotas, withdrawals, duration of studies, number of graduates and other job prospects for graduates

Source: Quebec Ministry of Public Safety.

This analysis, that is submitted to the *Comité de concertation sur la formation des futures policières et des futurs policiers du Québec*, presents the findings that guide the decisions of the various partners of this committee. A memorandum of understanding signed in 2014 by the MSP, the ENPQ and the MEES governs the establishment of this committee[18] which has the mandate of fostering the best possible alignment between the needs of municipal police services and the SQ for new police officers, and the police labour force to be trained. The predicted number of police officers to be trained by educational institutions is determined in connection with labour force needs. Among the committee members, the MEES is responsible for establishing quotas for the 12 colleges that offer the Police Foundations program. Representatives of ENPQ, responsible for setting the number of places in the initial patrol constable training program, also sit on this committee. This approach maximizes the chances of having enough new police officers to meet the staffing needs of municipal police forces and of the SQ.

For example, in the 2015 fall analysis of police staffing needs, the growth rate of the police service is compared to the growth rate of Quebec's population, but demographic variables do not play a key role in the planning of police staff to be trained. Also, the impact of population aging is mentioned, given the wave of numerous baby boomers retiring. The macro-economic situation plays a critical role in decision-making, but not as a priority, unlike the number of planned retirements and hires, variations in the number of permanent police officers and casual temporary police staff, which are important variables. For instance, financial capabilities of the government and municipalities, and legislative changes were taken

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[17] The *Questionnaire sur l'administration des activités policières* is used to collect data to analyze police staffing needs, but also to gather other kinds of information, for instance on police equipment and policing activities.

[18] In addition to the signatories to the agreement, the following organizations are represented on the *Comité de concertation*: public and private colleges providing training in police technology, the *Association des directeurs de police du Québec*, the SQ and the SPVM.

into account when planning police staff to be trained. This is the case with the act to amend pension plans passed in December 2014, which will definitely affect police officers retiring.[19] Agreements established during the renewal of collective agreements are also likely to have an impact on the conditions for taking retirement.[20] Lastly, the economic realities must be considered when planning police workforces as well as financial constraints.

The in-depth analysis of changes in police labour force needs over time also helps with determining the needs for a given year.[21] The variables considered are the actual increase in the police workforce, the departure of police officers, variations in casual temporary police staff and the number of ENPQ's graduates. The two latter factors provide an estimate of the pool of police officers available for permanent recruitment to a police organization. This type of analysis makes it possible to determine the overall police labour force needs for three years by factoring in variations over the past 10 years. The variations in past years give an idea of potential variations in the years to come.[22]

Adequacy between Police Staffing Needs and Police Training

The planning of new police officers to train takes into account the enrolment capacity of educational institutions and quotas that are sometimes set by the MEES in terms of the number of subsidized admissions. It is also necessary to consider the number of withdrawals and the duration of studies (expected and actual). Moreover, since other job prospects exist for police technology graduates outside the SQ and municipal police services, the number of graduates does not precisely indicate the potential number of police officers available to police organizations.[23]

The typical path for becoming a police officer in Quebec is to obtain, following a three-year program of studies, a diploma of college studies (DEC) in police technology from one of the twelve general and vocational colleges (CÉGEPs) that offer that training.[24] After obtaining a DEC in police technology, aspiring police officers must then complete the ENPQ's 15-week initial patrol/policing training program. For admission to the colleges and the ENPQ in these two training programs, the MEES (for the number of subsidized spots in colleges), and the ENPQ (for patrol/policing training) sets quotas (maximum number of spots per college and for the ENPQ). The best possible adequacy between the training supplied and the quantitative and qualitative labour force needs of police organizations is the mandate of the *Comité de concertation sur la formation des futures policières et des futurs policiers du Québec*, chaired by the MSP.

The next sections of the research report present the specifics of police resource allocation by the SQ and the SPVM. First, we present an overview of the innovative approach being developed by the SQ. Then, the SPVM's approach is given as an example of optimizing staff distribution among the various neighbourhood police stations of a municipality as part of the *Police de quartier* neighbourhood policing model.

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[19] This refers to the *Act to Foster the Financial Health and Sustainability of Municipal Defined Benefit Pension Plans.*
[20] Note that the collective agreements of the various police services vary.
[21] For example, in 2015, data compiled between 2005 and 2014 were analyzed.
[22] Recall that the number of police officers trained can be adjusted only at the beginning of training, when the quotas are set at the colleges (3-year training) or the ENPQ (15-week training), and cannot be changed once the training has begun.
[23] This is the case with hiring special constables at the National Assembly and in the courthouses and with recruiting graduating students as correctional officers or by the RCMP.
[24] In Quebec, 12 CÉGEPs offer the program of study leading to a Diploma of College Studies (DEC) in police technology following a three-year training program. Of those 12, four colleges also offer a 30-week training leading to an Attestation of College Studies (AEC) in police technology for people belonging to target groups admitted under certain conditions.

Sûreté du Québec

Pursuant to the PA, the mission of the SQ is to maintain peace, order, and public safety; prevent and repress crime; ensure the safety of persons and property; safeguard rights and freedoms respect and remain attentive to the needs of victims, and cooperate with the community in a manner consistent with multiculturalism (Sûreté du Québec, 2016). [Translation] "The SQ supports the police community, coordinates large-scale police operations, contributes to the integrity of government institutions, and ensures the safety of transportation networks in Quebec" (Sûreté du Québec, 2016). It has jurisdiction to enforce the law throughout Quebec and enforce bylaws within the municipalities it serves.

The SQ has service points that serve over 1,000 cities, municipalities and territories across 86 RCMs, while patrolling Quebec's highways (Sûreté du Québec, 2011: 13). As a level 6 police service, it supports the municipal and First Nations police services when circumstances require. The partnership between the police services is an essential component of the overall provision of public safety to the population (Sûreté du Québec, 2011: 30).

[Translation] "Authorized positions are authorized by credit book or a decision by the Treasury Board… The distribution of positions by district is determined based on the following criteria: the population, the area of the territory, the workload and regional characteristics." (Sûreté du Québec, 2015: 52). The Treasury Board Secretariat (TBS) sets an annual workforce target to be used by public organizations in which the members of the staff are subject to the *Public Service Act* (Sûreté du Québec, 2015: 56). Lastly, the cost of the police service provided to municipalities is based on the *Regulation respecting the amounts payable by municipalities for the services provided by the Sûreté du Québec*.[25]

As part of the 1996-1997 police reform, the SQ performed an in-depth review of its service to municipalities and, as a result, of its partnership approach. The signing of the first service agreements introduced a new philosophy and a collaborative dynamic between the *Sûreté* and elected officials. The SQ, through the Minister, does not sign agreements directly with the municipalities but rather with the RCMs or equivalent territories. In the early 2000s, in order to improve collaboration and the services provided, changes were made to the agreements, resulting in a second generation of service contracts. The PA sets out the legal framework of police service agreements and determines the elements that must appear in the agreements, including the number of police officers allocated to the services, the duration of the agreement (minimum of 10 years), and the nature and scope of the services provided. The police resources organization plan accompanies the service agreement, specifying the organization and distribution of resources throughout the territory being served. This plan consists of three parts: the profile of the RCM or equivalent territory; the distribution and management of resources; and the organizational structure. Police resource organizational plans are approved by the *Comité de sécurité publique*.

The allocation of police resources is based on the SQ's billing system for services, which dates back to 1997 (PA). A concerted approach is applied, based on the principle of equity toward all Quebec citizens. To receive police services, municipalities pay the Government of Quebec a financial contribution based on the average cost of a police officer, the municipality's standardized property value (SPV)[26], and the size of its population[27], the number of officers assigned and the total financial contributions of all the municipalities served by the SQ (Sûreté du Québec, 2016a). As a result, the municipalities served by the SQ are billed for a service, not for the number of staff. The billing is based on three principles: 1) the total cost of the service based on the total number of police officers (in accordance with the 86 service

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[25] CQLR, ch. P-13.1, r.7.
[26] The SPV is used to determine the municipal contribution for SQ services. It includes the standardized assessment values of all of the municipality's taxable property, the total or partial standardized assessment values of certain non-taxable property in respect of which payments are made in lieu of municipal taxes, and the equivalent assessment value of the capitalization of payments in lieu of taxes paid in respect of certain structures used to produce electric power.
[27] A municipality's standardized property value is multiplied by a multiplication rate that varies depending on the size of its population.

agreements) multiplied by the average cost of a police officer;[28] 2) the amount billed to municipalities (53% of the total cost of the service); and 3) the amount billed to each municipality, which corresponds to a portion of the total amount billed to all municipalities.[29]

The municipalities served by the SQ are not billed based on the average cost per officer, but rather on their standardized property value; the more property value a municipality has, the higher its bill is. This approach of solidarity is considered to be socially-democratic and is the key characteristic of the SQ police service context. Municipalities that are billed for SQ services share 53% of the total cost (the other 47% is paid by the provincial government), in different proportions, which vary depending on their wealth.

Therefore, if, for example, a municipality's crime rate increases or decreases, their financial contribution would not change as a result. Inequalities in the workload of police officers from one RCM to another evidently result from this approach. During the 2000s, the SQ wanted to improve the coordination of its practices with the needs and expectations of its municipal partners. Therefore, the 2012-2015 strategic plan called for the modernization of the service offered in order to better meet the changing needs of service agreement signatories (Sûreté du Québec, 2011: 31). Continuous improvement of internal practices to support police activities is one of the issues identified in that strategic plan, which states that [translation] "the Sûreté's capacity to deliver quality services is dependent on its ability to analyze and adapt to its environment by anticipating its needs, particularly with regard to human and technological resources" (Sûreté du Québec, 2011: 34). That is why the SQ is aiming to systematize the forecasting of trends, phenomena and problems, and implement an integrated approach to labour force planning.

The workforce allocation approach has changed to modernize the police services delivered by opting for a more objective model and greater flexibility in workforce management in order to adapt to the realities of each territory. Thus, from 1990 to 2000, the SQ applied distribution models proportionate to the population and crime rates. Then, in 2004-2005, a model based on the workload measured using *cartes d'appel*, forms filled out by telecommunications operators at call management centres for distributing cases among police officers, was implemented. Given the renewal of a large number of service agreements, in 2012 the SQ resumed a review of the overall service offered to municipalities and the distribution of its police staff throughout Quebec. As part of the modernization of its service offerings and to better meet the needs of RCMs, the SQ developed a model for assessing the workloads of patrol officers in order to distribute resources more objectively and fairly (Sûreté du Québec, 2015: 38).

Respecting the financial framework of each party involved, despite changes in the distribution of staff is an issue and serious concern. One of the options being considered is extending the fundamental principle of equity of the service offering. The fair distribution of the operational capacity would ensure comparable and consistent service quality in each RCM, while accounting for their specific needs and the actual demand for police services. By having the same occupancy rate, meaning the same proportion of time dedicated to the workload, regardless of where they are allocated, police officers in the SQ would be able to invest proportionately the same proportion of proactive activities and community policing activities. This would make it possible to achieve better alignment between occupancy rates and availability rates, and recommendations in the literature.[30] The process followed by the SQ to modernize police resource allocation is based on three phases: to assess the workload of patrol officers; to plan the distribution of staff among RCMs; and, to renew the service agreements based on established principles (refer to the entire process in Table 4).

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[28] Under the *Regulations respecting the amounts payable*, the average cost per police officer is calculated by dividing the total cost of serving all the RCM (total cost in 2016: $*556,420,700)* by the number of police officers in the agreements (in 2016: 3369 officers). The average cost per police officer therefore varies annually, because the total cost of service varies.

[29] This equalization ratio is calculated based on the following numerator: SPV * multiplication rate * a municipality's neutrality coefficient and the following denominator: Total (SPV * multiplication rate * neutrality coefficient) of the 1,040 municipalities.

[30] The occupancy rate = workload / availability time.

Table 4: Processes followed by the SQ to modernize police resource allocation

Assessment of the workload of patrol officers
Identification of objective parameters for quantifying and comparing the workload
Development of the model for analyzing the workload of patrol officers
Collection/compilation of data
Measurement of the workload
Planning the distribution of staff
Development of the model for staff distribution
Calculation of the provincial occupancy rate (central measurement) and RCM occupancy rates
Analysis of the service portrait
Development of an acceptable interval-level level (*intervalle jugé acceptable*)
Determination of operational thresholds to ensure efficient and safe functioning
Consideration of historical agreements and political, administrative and financial factors
Service agreement renewal strategy
Compliance with workload and distribution principles
Agreement in principle with the framework agreement
Discussions on the service offering and framework agreement by RCM
Formalization – adoption of agreements by RCMs

To assess the workload and determine the distribution of staff, studies were conducted in collaboration with university researchers.[31] The first phase of the study made it possible to identify objective parameters for quantifying and comparing the workload of police officers at RCM stations. The second step demonstrated how to optimize police deployment based on the estimated workloads provided by the first phase.

Assessment of the Workload of Patrol Officers

The three fundamental variables of the model for analyzing the workload of patrol officers are the volume of responses (service requests), the nature of the police response, and the time required to carry out the response (refer to the components of the model in Table 5). To measure the workload, researchers used both the information provided by SQ call cards and incident reports for the 2000-2013 timeframe. The two internal databases being independent, they had to validate, clean and match the data to measure the workload accurately without doubling the time for certain incidents. They complemented the information with data collected from a sample of police officers using structured questionnaires and with field observations. The analysis of the workload is therefore based on data validated using a triangulation process.

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[31] The studies of the workload and the distribution/deployment of workforce (which is based on the workload results) are two separate studies conducted by different teams. However, the only official document resulting from these studies is: Chartrand, Éric; Verret, Éric-Alexandre and Picard, Véronique (2014). *Un modèle hybride de l'évaluation de la charge de travail des patrouilleurs de la Sûreté en soutien au déploiement cohérent et équitable des ressources policières parmi les unités.* Sûreté du Québec et Université de Montréal.

Table 5: Components of the model for analyzing the workload of SQ patrol officers

Volume of responses
- # of service requests - # of files entered into the *Module d'informations policières* (MIP) - # of *cartes d'appel* (forms) - # of *cartes d'appel* assigned to a patrol officer - # of *cartes d'appel* associated with an operational case record in the MIP - # of *cartes d'appel* assigned to a patrol officer and associated with an operational case record in the MIP - # of *cartes d'appel* not associated with an operational case record in the MIP and with response time
Nature of the response
Type of response
- Type (first MIP incident code)
Level of complexity of the response
- Single or multiple incident codes in the MIP - Priority level of the call received - Request for reinforcements - Security issues
Incident circumstances and outcomes
- Arrest/custody
Response time (entire response)
- Time associated with the call - Travel time - Operational management time - Administrative and legal management time

Over 13 years of data taken from nearly 7 million forms completed (*cartes d'appel)* for distributing cases among police officers were used to assess the response time. The *cartes d'appel* don't provide information about the end of the process related to an incident; on the contrary, the data recorded by police officers is more exhaustive since it covers most of the entire response and facilitates quantification of police resources according to the multiple phases of an incident.[32] However, it does not include case disposition. This source also records the level of complexity of police incidents, accounts for the nature of the response and the security issues.[33] The incident reports, operational case records and the *Système informatisé de gestion des mobiles et des appels* (SIGMA) [Automated Management System for Mobiles and Calls] were therefore used for research purposes.[34]

Since neither the *cartes d'appel* nor the police reports include case disposition, the SQ completed these data sources by collecting complementary data for its study. A total of 41 SQ stations located in urban, semi-urban and rural communities were visited, and the research staff conducted nearly 500 hours of observation in the field. The police officers filled out more than 500 questionnaires. That self-reported data provides detailed information on the response time, the complexity and outcome of the incident and the participation of reinforcements. This data collection enabled the SQ to know how much time, based on the nature and complexity of cases, officers spend managing requests from the population that result in an operational file. For example, the SQ is now able to predict how much time will be invested by patrol

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[32] For example, certain calls may require no follow up, while others are related to indictable offences and therefore to the creation of a criminal record, leading to a greater workload for the police officer.

[33] Note that the data collected manually in the field by police officers are then incorporated by administrative staff into the SIGMA.

[34] The study conducted by the SQ demonstrated that administrative and operational management of operational files represents over 80% of officers' workload, which is why it is important to take this into account when measuring workload.

officers into a case of assault (based on two levels of complexity), to take charge of the incident operation (responding on the scene, arrest, transport to the station, questioning, right to a lawyer, release or transport to a detention centre) and to complete all the clerical and administrative tasks related to the matter (organizational obligation) as well as to write and produce any documentation required by the legal system as needed. This basic information compiled in the research studies mentioned above deals with the response overall and facilitates quantification of police resources based on the multiple phases of an event.

The primary objective of the SQ study was to produce standardized values that are representative of the workload and reflect as reliably as possible the time spent by front-line police officers on carrying out the multiple tasks involved in different kinds of routine responses taken as a whole.[35] The model also takes into account that these response can vary in nature and complexity. They may or may not be initiated in response to CFS, may or may not generate the opening of operational files, and may or may not involve the commission of a criminal offence. These standardized values are based on the following:

1) responding officer's travel time (response time)

2) time for the responding patrol officer and any reinforcements to secure the scene

3) time spent on subsequent operational measures (for example, surveillance of a person being transported to a detention centre or a health care or social services institution, questioning, appearance of a person taken into custody).

Determining Staff Distribution

Workload estimates enabled the SQ to get an overview of the 104 stations making up the police service. Then the objective was to determine the number of patrol officers required per station to ensure equity in the quality of police services provided to the various RCMs, since the service offered must be comparable from one RCM to another with fair distribution. For example, a station that takes on 4% of the SQ's total workload should theoretically have 4% of all SQ police officers. The objective would be to achieve a similar patrol officer occupancy rate. Theoretically, the detection of discrepancies between the model estimates and the actual situation would result in changes to staff distribution, leading to police officers being removed or added. However, complete equity in the distribution of police services among RCMs is difficult to apply. Other parameters must be considered, since the current distribution is based on historical agreements and has political and union implications. Certain territories would lose staff while others would gain, but, according to the billing model in effect, the bill would remain the same, which could cause dissatisfaction. Lastly, changes that are too great would result in a large number of police officers moving from one RCM to another, which would be unrealistic and too costly. Rather than aiming for complete equity, the SQ explored a staff deployment approach developed around a model based on the occupancy rate, the acceptable interval-level concept and the concept of operational threshold (see Table 5).

The occupancy rates are calculated by comparing a patrol officer's workload to availability time based on a 9-hour workday using the following formula: workload / availability time. The average vacation time, sick leave and training is factored in when calculating availability time. The resulting occupancy rates of RCMs were then compared with the Quebec provincial occupancy rate (which was used as central measurement). After, the objective was to determine how to reduce discrepancies between occupancy rates by reducing the gaps between each MRC rate and the Quebec average rate. For this purpose, the concept of acceptable interval level (*intervalle jugé acceptable)* was developed. According to this method, a standardized percentage difference between the MRC rates and the Quebec rate was applied to each of the MRC rates. This approach, if used, would mitigate the effects of equity in the distribution and

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[35] This section is based on extracts from an article to be published by the SQ.

limit the movements related to the variation in workload by applying a reasonable percentage of discrepancy. Then, operational thresholds (*seuils opérationnels*) were set for each RCM so that they have the staff needed to operate effectively and safely.

The SQ developed various scenarios regarding the reduction of discrepancies between the occupancy rates of RCMs based on this model. The alternatives also take into account the content of existing agreements and political, administrative and financial factors related to workforce changes. This approach is one of the options currently being studied to respond to operational, contractual and administrative issues. It seems to be more realistic than complete equity and would enable RCMs to provide more or less comparable service quality. The optimization of planning and deployment of staff is continuing at the SQ as part of the renewal of service agreements, and discussions are currently underway with municipal elected officials, their representatives and the Ministry of Public Security.

Service de Police de la Ville de Montréal

The SPVM serves the entire Island of Montreal, with an area of 496 km^2. [Translation] "The police model adopted by the *Service* in 1995, *Police de quartier*, is based on community policing principles and puts citizens at the heart of its organization" (SPVM, 2016). Police services are delivered on a territorial basis. After 1997, the model was adjusted based on various studies in order to improve its functioning and eliminate certain gaps. Then, a review process was initiated in June 2002, involving consultations with elected officials, citizens, various organizations, partners and staff. In 2003, proposals to make changes directly related to the SPVM's overall directions and operational priorities were suggested in the report "Optimisation de la police de quartier." [Neighbourhood Policing Optimization][36] One of the targeted objectives was to coordinate the SPVM service offerings by accounting for its ability to respond to demand while maintaining the community approach.

To apply each component of the *Police de quartier* model appropriately throughout the territory, responding to the population's needs and expectations, the SPVM must ensure that all neighbourhood police stations have the required staff available to them, especially stations that receive a high volume of calls dispatched and initiated. Furthermore, it is essential to ensure the presence of a sufficient minimum workforce (critical mass) at the neighbourhood stations. According to the assessment, the number of police officers at certain stations was insufficient to meet the service offering, provide the required staff for certain incidents, or ensure night coverage.

Therefore, the SPVM examined the staff distribution criteria approved by elected officials for allocating resources based on the objectives and components of the *Police de quartier* model when it was adopted in 1995 (see Table 6). The optimization of police deployment among stations is based on a staff distribution formula. To implement the reactive component of the *Police de quartier* model, part of the workforce is distributed among stations based on the volume of calls and resulting workload. Staff distribution also aims to ensure that the proactive component of the model is applied by all stations, as a result of which the police officers must develop an in-depth knowledge of the territory; be able to identify and resolve problems; establish and maintain partnerships with the population, merchants and local organizations. The criteria for distributing residual staff (after having distributed 50% of the workforce among the stations based on service calls) associated with the proactive component of the model are the size of the neighbourhood's population and number of businesses, the presence of social problems (indicated by violent crime), the existence of a mobile population, the area of the territory and vehicle traffic. The weighting established in relation to these criteria is based on the experience and empirical knowledge of reality of the elected officials and chief inspectors in charge that were consulted (see Table 6). It is the result of discussions aimed at meeting the operational interests of the various parties and ensuring a certain level of equality in the territory.

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[36] This section is largely based on the SPVM reference (2003).

Table 6: Factors determining deployment of staff to stations in the territory served by the SPVM

Reactive component (50% of the total workforce is allocated based on the workload related to calls)
Volume of calls and resulting workload
Proactive component (50% of the total workforce is allocated among stations based on a pre-determined weighting)
Number of residents and businesses per neighbourhood (60%) Population in movement (or dynamic population) (10%) Area of territory (5%) Vehicle traffic – traffic density (5%) Violent crime as an indicator of social problems (20%)
Minimum workforce (for each station: 35 sworn neighbourhood police officers split into 5 groups and 2 socio-community officers for a total of 37)
Police presence in training Police presence in court Minimum presence of police officers allocated to problem resolution, operations by program and various police contingents Minimum resources to respond to needs, accounting for time spent on meals and at operational centres Availability to perform necessary prevention and ensure visibility Flexibility required to develop and implement programs and strategies to combat incivility and criminal behaviour Adequate supervision ratio Resources required to ensure adequate policing expertise
Other factors considered when allocating police resources
Absences, retirements, overtime and future hires

Note: For example, 60% of the residual staff (50%) associated with the proactive component, i.e. 30% of the total workforce, is distributed among the neighbourhood stations based on the size of the population and number of businesses.

While the 2003 study recommended maintaining the staff distribution criteria because they were a good reflection of the objectives of the *Police de quartier* model, it did recommend adjusting the weighting for the reactive component. In fact, the calculation of the reactive workforce underestimated the resources actually required to respond to calls: 26% of the workforce was allocated to perform this component, while in reality the neighbourhood stations were devoting an average of 50% of their patrol time to respond to dispatched or initiated calls. The method used from 1995 to 2002 excluded the time spent between calls and underestimated the resources actually required to respond to calls. As a result, 50% of the workforce was allocated based on the workload related to calls (calculated by the neighbourhood police station and based on call codes), and the residual workforce (proactive component) was deployed based on the other aforementioned criteria.

Lastly, the neighbourhood police stations must have a base staff sufficient to fulfill their mission autonomously, as set out in the *Police de quartier* model, which encourages decentralization of activities to ensure the maximum number of service points (neighbourhood stations). Initially, the minimum workforce at a station was set at 25 neighbourhood officers (i.e. five groups alternating shifts, with at least one car of two on duty at all times at each station), two socio-community officers and one support officer (in addition to supervisors and the commanding officer). However, after applying that standard for five years, the SPVM noticed that it did not promote operational efficiency of the smallest stations, which were having difficulty operating autonomously. The critical mass for stations was therefore increased to 37 officers, including 2 socio-community officers, split into five groups of seven people. Various factors were taken into consideration to set the minimum number of staff, including the specifications of the *Police de quartier* model, the management of the workload, training, supervision and expertise (see Table 6).

To be able to achieve this minimum goal in all neighbourhood stations, the SPVM performed an administrative and operational restructuring of the neighbourhood stations, grouping officers from certain neighbourhood stations with those from a neighbouring and similar station within one command unit without actually combining them. Some neighbourhood stations consist of patrol officers, while others are designated command units, based on the space available, their geographical location, ease of travel and parking, the ownership of the facility and lastly the proximity of district offices and community organizations. Officer and civilian employee positions that were restructured were converted into other types of positions (supervisors, floating teams of police information technicians, support positions for operational and administrative needs, neighbourhood station investigators, etc.). This reinforcement of neighbourhood stations by modifying the administrative and operational structure and the redistribution of staff had the ultimate goal of appropriately responding to calls while providing other aspects of the service offering. Workforce planning also takes into account absences, retirements, overtime and future hires. Note that the staff distribution calculations are periodically reviewed to reflect trends in service calls, violent crime, demographic factors, in short, all of the criteria identified in the formula.

Following the environmental scan in 2013, the SPVM research team proposed three strategic directions approved by the direction for the 2014-2016 timeframe. One of those directions, mentioned in the 2013 police service annual report, consists of ensuring that the SPVM is an agile, successful and efficient organization (SPVM, 2014: 25). The concept of organizational agility promotes faster response times and the ability to anticipate and innovate. Organizational transformation was one of the components involved. In a context of government restructuring, the SPVM is closely following the repositioning of services and the efforts made by police services around the world, while participating in initiatives to refocus its mission (Desrosiers, 2014: 231). A new strategic planning process is currently underway, aimed for completion in 2020.

Discussion

Proper planning of police resources represents a key issue in the provision of services, nationally by the RCMP, provincially by the OPP and SQ, and municipally by organizations such as the SPVM.[37] The problem to be resolved is to estimate the number of police officers required to provide appropriate services by deploying them effectively in time and location. The fundamental first step is to determine the nature of the services to provide given the mandate of the police service, the definition of police work and the role expected of police officers.

The RCMP, OPP, and SQ are required to set police personnel levels in their service contracts that are approved by the Provinces, Territories, Municipalities, and First Nations Communities. The MSP applies the provisions of the PA by authorizing minimum resource levels to ensure that provincial and municipal police services provide the legislated services according to the PA. In the case of the SPVM, it is required to plan the number and distribution of police officers in the various neighbourhood stations across the entire territory served. In recent years, these organizations have undertaken a reflective process to improve planning for and deployment of police officers. To this end, they have called on their analysts and human resources personnel, while also benefitting from input from external researchers in some cases.

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[37] The Royal Newfoundland Constabulary (RNC), working in Newfoundland and Labrador, is the third provincial police service in Canada but is not included in this study.

Police Resource Allocation Approaches and Methods

All four main approaches to staffing allocation identified in the literature have been observed in this selection of large Canadian police services. Moreover, some organizations even use a mixed approach. In Quebec, the MSP approve police staffing based on the analysis of the police organization plans submitted by the municipalities that are served by a municipal police service. As a matter of fact, some use of the workload-based approach is common to all police services considered (RCMP, OPP, SQ, and SPVM). A minimum staffing approach is simultaneously applied by the OPP and the SPVM, while the SQ has determined operational thresholds to ensure effectiveness and safe functioning of all detachments. Finally, the SPVM also uses a per capita approach to deploy a percentage of its workforce according to pre-determined weighting based on the number of residents, among other criteria.

All of the models reviewed in the current study rely on evidence-based data in keeping with the current trend in police resource planning. The basic forecasting approach is based on an objective methodology and quantitative data, although complementary qualitative information is also used. Historical data are analyzed to extrapolate past data in order to predict the future. The GDPRM uses RCMP historical workload data, as well as other Detachment specific data (dispatch and shift schedule) to simulate the calls for service within a Detachment at any given time period and the associated police response.The OPP has adapted the method developed in Illinois for allocating the required number of state police officers to address CFS, using various parameters which "gives management the flexibility of selecting different policing objectives and examining the distribution of manpower that satisfies these objectives" (Raub and Sweat, 1981). This model works either with a predetermined allotment of police or can be used to project the number of police officers required. The OPP assesses effects of devolutions upon detachment staffing parameters. The ministry of public security in Quebec considers a number of factors to determine the number police officers to train in order to meet the human resource needs of police services, through an analytic process based on quantitative and qualitative data, without imposing standards for measurement methods, indicators or targets to police agencies, because police activities are achieved by diverse police agencies in varied contexts and for different categories of police services. As a result, the relative importance of the parameters is not fixed by the MSP. The SQ has created an analytical method which is based on the calculation of occupancy rates, standardized workload values, and operational thresholds. A standardized percentage difference between the MRC and Quebec occupancy rates would be applied to the MRC rates if approved during the service agreement renewal process. At the municipal level, the SPVM distributes its staff between neighborhood detachments based on a deployment formula and distribution criteria.

Lessons Learned About the Process to Improve Human Resources Planning

In this review of the processes used by police organizations, it was observed that a number of elements could be replicated by other police services seeking to modernize their approach to resource allocation. The experiences recounted in this study stem generally from the adoption of a research approach. Definition of the mandate and identification of the police service's functions are key components to determining the direction of decisions on police officer allocation and deployment. A critical step in the process is the development of a conceptual model showing the parameters affecting service offering and the identification of the causal links between the many variables impacting workload. Data collection is another important element in the resource determination process. On the one hand, information is required on the variables identified by the model in order to calculate estimates. On the other hand, empirical data is needed to determine the extent to which resource planning resulted in effective response to real needs. The planning process can also consider past trends to anticipate future needs.

It seems relevant to analyse the advantages and disadvantages of the approach applied by a police service and to compare them to those of approaches used by other organizations. This exercise may lead to exploring various methodological options with the aim of developing a model meeting the specific needs

of the police service and the community served. As part of its feasibility study, the RCMP compared a number of models already in use in Canada and then explored the potential of macro regression models based on variables related to crime, service demand, and the size of the population. Mathematical programming models to allocate resources and develop work schedules were also considered. Ultimately, the RCMP developed the GDPRM, a computerized simulation that assists in the workload analysis of the General Duty uniform first responder resources at a given Detachment.

The OPP decided to adapt the model used by the Illinois police service, which had the advantage of being able to effectively estimate personnel requirements in rural areas. In spring 2016, this provincial police launched a comparative analysis of the results of its deployment model across all of its detachments in Ontario. Detailed data on each detachment were examined along with other factors not included in the model. In addition, information on the population and road infrastructure was updated in the model. The Deployment Model will be updated regularly to ensure the reliability of the information provided.

The SQ decided to modernize its approach to workforce allocation based on research, recognizing the value of developing a flexible, objective model that could adapt to the environment and anticipate needs. After having used a model based on distribution proportional to the population and crime rates, it developed a model based on workload measured by call cards. Then, in the context of renewing a large number of service agreements with the RCMs and territories served, it explored a process to distribute resources more objectively and fairly by better taking into account (but not exclusively) the geographic variability of the real workload of police officers. The new process involved identifying the parameters to quantify workload, developing an analytical model, and measuring the workload of patrol officers. Workload was measured retrospectively using available data, while empirical data on current workload were collected as part of a triangulation process. The theoretical distribution of resources determined using this analysis was then adapted systematically to respect the principles established for service agreements and minimize negative consequences that might result from overly severe changes.

It was thus determined that actual workload cannot be the only element considered when allocating police resources among the various areas served. The theoretical personnel distribution model being proposed by the SQ is based on workload, but also takes into account historical, political and administrative considerations related to current service. On the methodology level, the proposed strategy calculates and compares the occupancy rates of the RCMs with the provincial occupancy rate (central measure) to determine the gaps between actual allocation and theoretical average allocation. The SQ then applied a standardized percentage difference between the MRC rates and the Quebec rate to each of the MRC rate. The "acceptable interval concept" and operational thresholds to ensure effective, safe operation are also set.[38] As mentioned earlier, this new resource deployment model is currently being proposed to stakeholders involved in the renewal of service agreements. Historical agreements, political, administrative and financial factors are also expected to be considered in the discussions.

At the municipal level, the process used by the SPVM offers a different option to change resource allocation, this time between neighbourhood stations. The issue here was to ensure that all stations had enough personnel to properly implement the neighbourhood policing model (*Police de quartier*) adopted by the organization given the observed variability in the volume and complexity of calls. The criteria for personnel allocation needed updating to optimize police deployment among the neighbourhood stations so that the latter are able to respond to CFS while implementing the proactive aspect of the proposed policing model. The SPVM kept the same criteria but adjusted the weights of the criteria based on all aspects of the actual work. It used these observations to also increase the minimum number of police officers required to be on site at all neighbourhood stations. A unique aspect of the approach involved

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[38] As it was mentioned earlier, the occupancy rates are calculated based on patrol officer's workload and availability time based on a 9-hour workday (workload / availability time). The average vacation time, sick leave and training are factored in when calculating availability time.

changes to the administrative and operational structure to create groups of neighbourhood stations and to change the function of some of them. Note that the personnel allocation that resulted from this exercise is reviewed regularly to adjust for crime trends and demographic changes.

Parameters Included in the Police Resource Allocation Models Reviewed

The systems developed use recent workload data while, in some cases, actual planning is also based on the analysis of past trends and historic agreements. The human resources aspects (work schedules, vacation time, sick and maternity leave, etc.) are essential elements of the personnel planning process. In addition, the scope, nature, and trends in crime in the area served by the police organization are critical factors in the planning process. Lastly, the social and historic context, along with the characteristics of the population and territory, generally influence the determination of resources and their allocation. The relative importance assigned to these various parameters, and their inclusion in the resource allocation model varies over time and police service. The weight assigned to quantitative data is critical and the latter are subject to thorough analysis. However, it should be noted that more qualitative aspects of policing are also taken into account.

For information purposes, it is useful to compare the main parameters at the core of the approaches or models examined in the current research, although such analysis is limited by the level of details available at the time of our study (see Table 7). It should be noted that this list does not pretend to be exhaustive and only represents the most critical elements. It is provided in the hope that it may inspire other police organizations looking to change their resource planning approach.

This set of variables is not treated homogeneously by the organizations considered in this study. While some of the parameters are essential, others are not necessarily so, and still others are even excluded. The emphasis on the appropriate response to service calls stands out in all of the police resource allocation models studied. The number of service calls does in fact constitute a fundamental element of the planning process. It is necessary to ensure satisfactory handling of service calls based on their nature and level of complexity, keeping in mind that the particular characteristics of each individual call can affect the police time required. Sufficient police personnel is required to respond to all requests and allocate a reasonable individual workload, while still being able to provide back up, as required. These aspects are generally considered directly in the models, in order to be able to adequately carry out the various steps associated with responding to calls for service within a reasonable time and in total safety. Police availability requirements must inevitably take into account aspects related to work schedules and overtime. Similarly, it goes without saying that police availability also depends on leave, departures, transfers, retirements, recruitment and training of individuals. It is also often considered prudent to take into account constraints related to the number of new police officers produced by training institutions.

In addition, service calls are the result of criminality at work in the community, so it is important to take into account crime levels and trends at the macro-societal level. However, these indicators are generally analysed outside of the models. Such is the case for crime rates, the emergence of new forms of crime, and the presence of criminal groups in the area, particularly street gangs. Police services can also take into account differences in crime levels between neighbourhoods in the allocation of personnel between police stations, based on predetermined criteria.

Table 7: Main factors and indicators for resource allocation

Domains	Factors / Indicators
Policing model and Service standards	Policing approach % time devoted to reactive and proactive components Profile of time standards (lower and upper limits for each component of service) % CFS to be answered immediately % of availability to answer CFS Call priority Police officer safety standards Call out rules (after scheduled hours for non-24 hour detachments) Adequate supervision ratio Acceptable interval between total occupancy rate and detachment occupancy rate
Minimum staffing	To apply the policing model To achieve planned tasks To meet safety standards To meet community expectations Operational threshold
Schedules and detractors	Shift schedules Time spent on meals and breaks Officer availability Overtime, leaves, statutory holidays, and transfers # of retirements and anticipated retirement rates Recruitment Training
Workload	# CFS and other service requests Priority level of CFS Distribution of CFS Complexity level of the response (single or multiple incident codes) Security issues Time associated with the call (operational, travel, administrative and legal) Incident circumstances and outcomes (arrest / custody) Total workload Volume of intervention Occupancy rate (provincial and detachment rates) Likelihood of back up and assistance
Crime	Description of crimes by nature and service level Violent crime Reported and initiated crime Known and reported criminal behaviour Hidden and under-reported criminal behaviour Trends in crime New forms of crime Presence of street gangs or other criminal groups Road safety (# of highway safety code incidents) Other problems disturbing peace and good order

Demographic and geographic factors	Population size (# residents and # tourists) Population growth trends and trends affecting the seasonal population Population aging (police retirements) # businesses per neighbourhood Population mobility Territory characteristics (size, forests, navigable waterways, # km of roads and off-roads trails) Vehicle traffic density
Political, legislative and economic factors	Historical agreements (police contracting services) Financial capabilities of the government and municipalities Changes to legislation and funding (pension plans, financial capabilities…)
Others	Historical trends in the policing services (labour force needs and departures) Enrolment capacity of training institutes Technological trends

Relying on observation and experience, a minimum personnel threshold is set in order to address officer safety and work effectiveness issues. Here again, workload measurement is part of the process of identifying minimum thresholds. Policing standards have an effect on deployment. These standards vary according to the policing model chosen, among others the level of importance to be assigned to reactive and proactive activities and crime suppression and prevention. Standards are generally set with respect to, among other things, response time, availability for responding to calls for service, percentage of calls for service that can be responded to immediately, call priority, officer safety and number of officers assigned to a supervisor. As we have seen, it is also conceivable to set standards with respect to discrepancies between the total police service occupancy rates and individual rates for police detachments.

The characteristics of the population and particularities of the area served by police services must also be considered. These aspects are generally analysed outside of staffing models, although in one of the models they are taken into account in the criteria for the distribution of police officers among the neighbourhood stations. Population size is the most frequent demographic factor, although population mobility is also taken into account in one instance. It could be mentioned that population aging, which is shown by the modification of the age structure, could potentially be introduced into the analysis, given the distribution of crime by age. Finally, historical data on police personnel distribution are necessarily considered, along with financial constraints and the impact of certain legislative changes.

Conclusion

As we have seen, the RCMP uses its computerized simulation (GDPRM) in conjunction with other workload analysis tools to identify the personnel levels required to provide services at Detachments. The simulation generated from the historical Detachment data on calls for service makes it possible to assist in the determination of resource levels and the strategic allocation of these resources. The OPP uses its computerized Deployment Model, which has also proven effective in rural communities, to identify the number of police officers required to respond to service calls by estimating the impact of devolutions on staffing levels in Ontario detachments. We gave as an example the system implemented in Quebec to enforce the provisions of the *Police Act* in terms of police resources. The Minister of Public Safety authorizes minimum personnel levels to ensure that municipal police services deliver the services set out in the PA, while recognizing the autonomy of those services to allocate resources. Police services are in charge of allocation and deployment of police officers in Quebec.

An alternative approach developed by the SQ is currently being discussed with elected officials and may be used for service agreements now being renewed. The SQ is seeking to ensure equity in the allocation of resources and the quality of police services offered in stations located in urban, semi-urban and rural areas. The approach is based on an analytical model of patrol officer workload using retrospective data supplemented by other data collection using a triangulation process. Workload estimates produced from this model offer a portrait of the stations providing police services and allow for the calculation of province-wide utilization rates and utilization rates specific to each service area. The rates by service area are compared to the province-wide rate to determine how to reduce differences between the individual rates and the central rate using an operational threshold and acceptable intervals.

At the municipal level, the example of the SPVM illustrates an approach aimed at implementing the neighbourhood policing model, inspired by the principles of community policing, and at optimizing the allocation of its resources in neighbourhood stations, among other elements. The goal of the SPVM is to ensure a degree of equity across the territory. Officer allocation is based on a formula and allocation criteria with weighting established based on experience and empirical knowledge of reality. Empirical workload and call data are also taken into account in this approach as is the case with the other police services considered in our study. The concept of a minimum staffing, to be able provide services independently, is also applied. In addition, structural changes were made to allow an optimum allocation of personnel.

In summary, the model developed by the RCMP is intended to assist in estimating the personnel required to provide appropriate police services in all locations at all times. The goal of the OPP model is to precisely identify the number of police officers required to enable detachments to respond to service calls. For its part, the MSP analyzes police staffing needs on a year basis in order to facilitate, jointly with the *Comité de concertation sur la formation des futures policières et des futurs policiers du Québec*, the best coordination between the number of new police officers to train and staffing needs of police organizations in Quebec. This approach ensures that the number of police officers required to answer their needs is met. The ultimate objective of the SQ's approach is to determine the allocation of police officers among service points to ensure quality service to all areas as well as a certain degree of equity. Lastly, the SPVM seeks to optimize the deployment of police officers among neighbourhood stations while ensuring a certain degree of equity. It wants to achieve operational effectiveness to fulfil its mission while applying the principles of community policing.

The models reviewed rely on evidence-based data, generally use a basic forecasting approach based on an objective methodology, and quantitative data to extrapolate past experiences in order to predict the future. These organizations all use recent workload data while, in some cases, actual planning is also based on an analysis of past trends and historic agreements. While the weight assigned to quantitative data is critical, it should be noted that the more qualitative aspects of policing are also taken into account in a comprehensive and holistic analysis. The human resources aspects are essential elements of the personnel planning process. In addition, variables related to crime are critical factors, as well as the social and historic context, along with demographic and geographic parameters. The relative importance assigned to these various parameters, and their inclusion in the resource allocation model varies over time and police services. A number of elements identified in this review could be replicated by other police services seeking to modernize their approach to resource allocation.

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