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A quantitative analysis of the impact or consequences of the US Coast Guard and Maritime Transportation Act of 2006

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Abstract: This study examined whether the Coast Guard and Maritime Transportation Act of 2006 affected the United States (US) Coast Guard performance characteristics with respect to incident response. The periods analyzed consisted of a decade before versus a decade after implementation of the legislation. Using analysis of variance (ANOVA) and the p -value approach ($p < 0.05$), six hypotheses were tested to determine whether statistically significant differences in response attributes existed during the 10 years before versus the 10 years following the passing of the legislation. Four significant hypothesis-testing outcomes represented differences in the number of incidents, incident responses, cumulative lives lost, and lives lost after notification.

Keywords: Coast Guard, emergency management, homeland security, military, search and rescue, strategic studies

1 Introduction

Strategic management and thought guide the long-term pursuits of organizations (Henry 2018). Van der Duin (2016) indicated that a substantial number of organizations may sometimes conform to a specific strategic approach or focus for a period of about 10–20 years. In some cases, the period was shorter and ranged between 5 years and

10 years (Van der Duin 2016). Such periods were appropriate for federal government endeavors and organizational pursuits (Warren and Siracusa 2021). For instance, the US Department of Homeland Security (2020) addressed its long-term vision via the use of strategic periods in the context of organizational strategy. Commensurately, one of its component organizations, the United States (US) Coast Guard (2018), also incorporated the notion of strategic periods toward accomplishing its strategic priorities.

The concept of punctuated equilibrium complements the fundamental notion of periodic change with respect to strategic management (Amason and Ward 2021). Within the context of organizational strategy, punctuated equilibrium represents the notion of some event interrupting a period of steadiness (Burke 2017). Wheelen and Hunger (2012) considered punctuated equilibrium as the organizational adherence to a specific orientation strategically for a period spanning about 15–20 years, but which involved some change with respect to an inflection point (e.g., “regulatory environment”). Similarly, Sabatier (2019) indicated that punctuated equilibrium involved stability and increments across some period that may or may not have incited substantial deviation from past behaviors or conditions. Additionally, legislation may affect the long-term actions of organizations, including the Coast Guard (Buhler and Wooster 2015).

The Coast Guard and Maritime Transportation Act of 2006 occurred about one strategic period after the events of 9/11, whereby the Coast Guard became a component organization of the US Department of Homeland Security. The legislation provided long-term funding supporting Coast Guard operations. Examples of such operations included the following: vessel anchorage and movement authority; international training and technical assistance; personnel actions (e.g., promotions, billets, and so forth); design-build contracting; reserve allocations; auxiliary equipment; icebreaker vessels; naval support; asset movement; cooperative agreement with peer armed forces; biodiesel feasibility; boating safety; judge advocate designations; and aircraft hangar construction (US Congress 2006).

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When the Coast Guard and Maritime Transportation Act of 2006 became law, one of the legislative goals was to strengthen the ability of the Coast Guard to perform its missions (Bush 2006). Therefore, this study examined the mission performance of the US Coast Guard with respect to the implementation of the legislation. More specifically, this study addressed mission performance by quantitatively examining the various facets of reported incidents, incident response, cumulative lives saved, cumulative lives lost before notification, and cumulative lives lost after notifying the Coast Guard. Given the acknowledgment of the legislation by Buhler and Wooster (2015) as a catalyst affecting organizations, considerations of catalysts within the context of punctuated equilibrium (Burke 2017; Sabatier 2019), and the notion of strategic period (Van der Duin 2016; Warren and Siracusa 2021), a question emerged: What was the impact of the Coast Guard and Maritime Transportation Act of 2006 with respect to the goal of strengthening the Coast Guard's ability to perform missions?

2 Overview of the US Coast Guard

Both human-made and natural threats endanger coastal areas and waterways. Such endangerments range from the natural ravages of hurricanes to the tragedies of systemic failures, such as the Deepwater Horizon (British Petroleum [BP]-operated Macondo Prospect) and the *Exxon Valdez* oil spillages (Testa and Jacobs 2014). Incidents of domestic and international terrorism also have the potential of affecting ports and waterways (Vesky 2008). A terrorist attack against a US port would instigate local destruction and influence the worldwide economy (Vesky 2008). The US Coast Guard safeguards the nation against such domestic and foreign endangerments.

The US Coast Guard originated as the Revenue Cutter Service in 1790 for preventing smuggling and for enforcing both trade laws and tariffs (US Coast Guard 2021b). During the nineteenth and early years of the twentieth centuries, it was termed the Revenue Cutter Service or the Revenue Marine Service (US Coast Guard 2021b). The service's growth was commensurate with the maturing and expanding of the United States (US Coast Guard 2021b). Headquartered in Washington, DC, and comprising about 40,000 personnel, its motto was expressed as *semper paratus* (always ready) (Gordon 2013). Historically, its services were used during the War of 1812, War Between the States, World War I, World War II, Korean War, Vietnam War, Gulf War, and the modern War on Terror (Gordon 2013).

The Coast Guard has long been tasked with deterring and interdicting (interrupting) drug flows involving the United States. Its entry into the War on Drugs commenced on 8 March 1973, when a boarding party from the *USCGC Dauntless* boarded a fishing vessel designated *The Big L* (Mitchell 2010). The encounter resulted in the Coast Guard's initial maritime seizure of >1 ton of illegal drugs (Mitchell 2010). During 1989, in conjunction with the National Defense Authorization Act, the Coast Guard was deemed the lead organization for the interdiction and apprehension of narcotraffickers among both high and territorial seas (Mitchell 2010). During the initial decade of the twenty-first century, despite federal deterrence and the Coast Guard's contribution toward the War on Drugs, approximately 70% of illegal drugs entered the United States unabatedly (McNicholas 2008).

During modern times, the Coast Guard has exhibited homeland security roles, such as humanitarian and search-and-rescue activities since these activities have been embedded within the mission of the US Coast Guard (US Coast Guard 2021a). For instance, during the aftermath of Hurricane Katrina, it was credited with saving at least 33,000 lives (Helvarg 2009). Given its successfulness, it was termed the "little service that could" (Helvarg 2009, p. ix). The Coast Guard's homeland security functions included port security and bridge inspection. Regarding the former, Ostrom (2012) indicated that the Coast Guard held responsibilities for port security both domestically and abroad since World War I. With respect to port security, it safeguarded against the potential of smuggling nuclear and biochemical weaponry into the nation (Ostrom 2012). Port security also involved the Coast Guard providing escort services for US Navy vessels as they entered and exited their respective home ports (Ostrom 2012). Its escort services also extended abroad, such as the escorting of vessels within Guantanamo Bay near Guantanamo Bay Naval Base (GTMO) (Ostrom 2012). The latter responsibility contributed toward bridge patrols. For example, after the collapse of the Interstate 35 (I-35) bridge in Minneapolis, the Coast Guard was tasked with inspecting the new bridgeway (Ostrom 2012). Such responsibility was commensurate with the duties of inspecting and certifying bridges that spanned national commercial and navigable waterways (US Code 2012).

Complementing its roles of inspecting and certifying bridges are considerations of enhancing public safety and accident prevention. For instance, in June 2021, a defective support beam was discovered in the I-40 interstate bridge that connected Arkansas and Tennessee across the Mississippi River (Biggar 2021). The Coast Guard closed all river traffic passing underneath the bridge (Biggar 2021). The

Coast Guard cooperated with the Arkansas Department of Transportation, the Tennessee Department of Transportation, and river stakeholders to close waterway traffic, bolster security, ensure safety, and monitor the situation (Taylor 2021). When the Coast Guard ordered the opening of riverway traffic flows, 67 barges and 1,485 barges had accumulated and queued, respectively, along the river (McGinnis 2021). The Coast Guard implemented a queue management system whereby orderly vessel flows and traffic prioritization occurred along the Mississippi River to abate bottlenecks (McGinnis 2021).

The Coast Guard also performed duties that protected events involving national leadership. Ostrom (2012) indicated that it cooperated with the US Secret Service in 2009 to protect President Obama and his family during a vacation at their Hawaii residence. Such protective details were commonplace within the Coast Guard's operational duties. For instance, the Coast Guard provided protective services when President Franklin D. Roosevelt visited Port Everglades, Florida (Cross 2003). Later, during the Nixon Administration, the Coast Guard provided a variety of security details and services when President Nixon visited with international dignitaries in Florida (Larzelere 2009). During the Carter Administration, the Coast Guard was tasked with providing a river ship of sufficient size to ferry a presidential helicopter during a presidential riverboat cruise spanning the distance between St. Paul (Minnesota) and St. Louis (Missouri) (Parr and Parr 2013).

3 Coast Guard and Maritime Transportation Act of 2006

The Coast Guard and Maritime Transportation Act of 2006 was signed into law by President George W. Bush on 11 July 2006. Its intended purpose was to strengthen the ability of the US Coast Guard toward performing its mission (Bush 2006). The Act provided funding for Coast Guard activities involving shipping, navigation, and environmental functions. Specifically, it provided \$1.3 billion for capital acquisitions that included integrated deepwater systems, \$284 million toward sustaining legacy aircraft and vessels, \$38.4 million for bridge alteration and removal, \$24 million for research and development, and \$12 million for environmental compliance and restoration (Smith and Drewry 2021).

In terms of a response capacity, it also facilitated a program for the long-range tracking of about 2,000 vessels via satellite systems as a means of enhancing security endeavors (Smith and Drewry 2021). The legislation

amended federal naval law for extending the authority of the Secretary of the department in which the Coast Guard operated toward controlling the anchorage and movements of vessels for ensuring the safety or security of US naval vessels in US navigable waters (Coast Guard and Maritime Transportation Act 2006). It included all waters of the US territorial sea as delineated within Presidential Proclamation No. 5928 of 27 December 1988 (Coast Guard and Maritime Transportation Act 2006). In conjunction with the Secretary of State, the Act also authorized the Commandant of the Coast Guard to provide regular Coast Guard operations technical assistance to foreign navies, coast guards, and other maritime authorities (Coast Guard and Maritime Transportation Act 2006). Regarding its duty performance, the legislation also authorized the Coast Guard to utilize motorized vehicles (given under its disposition by any member of the Auxiliary, by any corporation, partnership, or association, or by any state) to tow federal government property (Coast Guard and Maritime Transportation Act 2006).

All responses were conducted by human personnel. Given this aspect, the legislation authorized the Secretary, during an incident of terrorism or transportation security calamity, to order Coast Guard Ready Reserve members to active duty to a maximum of 60 days in any 4-month period and no more than 120 days during any 2-year period (Coast Guard and Maritime Transportation Act 2006). The Act prohibited Coast Guard Reserve officers on an active-duty listing from being counted within the authorized number of officers in the Coast Guard Reserve. It revised the distribution method for determining the number of active status Coast Guard Reserve officers who were authorized for service within each grade (Coast Guard and Maritime Transportation Act 2006).

The legislation mandated the initial appointment of the Director of the Boating Safety Office in the grade of Captain (Coast Guard and Maritime Transportation Act 2006). The legislation authorized the President of the United States to directly appoint permanently commissioned officers (within the Regular Coast Guard) to the grades of ensign through lieutenant regarding specified categories (Coast Guard and Maritime Transportation Act 2006). Officer appointments to the ranks of lieutenant commander or higher were to occur in conjunction with Senate advice and consent (Coast Guard and Maritime Transportation Act 2006). The Act amended federal armed forces law to classify Coast Guard law specialist personnel as judge advocates (Coast Guard and Maritime Transportation Act 2006).

The legislation provided a basis for funding a variety of Coast Guard functions whereby it fulfilled its mission.

However, its provision of a financial basis facilitated a greater capacity to acquire and access resource capital. Such endeavors were facilitated through human actions and decisions within the specifications of the legislation. Within the legislation, the ability to better appoint, equip, and train personnel provided a basis for improving both duty and mission performances within the Coast Guard. The legislation facilitated the appointment of 1,200 officer student positions and 2,500 recruit and special training student positions (US Congress 2006). It also provided a basis for rendering technical assistance, including for law enforcement, maritime safety, and security training (US Congress 2006). From a training perspective, Lincoln (2009) reported that the Coast Guard Training Center in Petaluma, California, implemented human performance concepts for identifying and improving human performance among enlisted personnel. Lincoln's (2009) approach incorporated standards and expectations when training commenced toward improving leadership capability at graduation.

Another example of improvement involved public affairs. Kroll (2017) reported that the US Coast Guard incorporated a unified paradigm regarding both personnel and training when compared to law enforcement entities. Such a comparison was feasible given the status of the US Coast Guard as a law enforcement entity that participated in law enforcement missions (Dolbow 2017) and that had a public safety dimension (Department of Transportation 1993). The US Coast Guard used training provided by the Defense Information School, which was originally designed for Department of Defense personnel (Kroll 2017). The altered training paradigm caused the US Coast Guard to implement its public affairs areas using combat-oriented public affairs training (Kroll 2017). As a result, the US Coast Guard adapted military public affairs tactics to the needs of public safety missions (Kroll 2017).

Mission performance involved the use of existing capabilities to accomplish specific mission objectives (Chan et al. 2010). Rivera-Paez and Crosbie (2020) indicated that mission performance was influenced by the readiness of assets (e.g., platform reliability and availability), consistency and adequacy of financing, and supportiveness from peer federal organizations and partners. Saving lives was a component of the Coast Guard's mission (Lurch 2004). During 2007, it celebrated its one-millionth saved life over the duration of existence of the organization (House of Representatives 2009). In 2008, the Coast Guard saved 4,910 lives (House of Representatives 2009). Nearly a decade later, it saved a total of 4,199 lives (Bureau of Transportation Statistics 2022). Given such improvement

in mission performance, a simple question emerged: What was the difference in mission performance and accomplishment a decade before versus a decade after the passing of the Coast Guard and Maritime Transportation Act of 2006?

4 Research questions and hypotheses

This study examined the long-term, strategic impact of the Coast Guard and Maritime Transportation Act of 2006 with respect to the goal of strengthening the Coast Guard's ability to perform missions. In order to investigate this issue, Coast Guard performance data were examined to investigate whether statistically significant differences existed a decade before versus a decade after the passing of the legislation. The research questions for this study were as follows:

- Q1: What is the difference between reported incidents addressed by the Coast Guard between the years 1996–2006 and 2007–2017?
- Q2: What is the difference between incident responses performed by the Coast Guard between the years 1996–2006 and 2007–2017?
- Q3: What is the difference between cumulative lives saved by the Coast Guard between the years 1996–2006 and 2007–2017?
- Q4: What is the difference between cumulative lives lost by the Coast Guard between the years 1996–2006 and 2007–2017?
- Q5: What is the difference between cumulative lives lost before notification by the Coast Guard between the years 1996–2006 and 2007–2017?
- Q6: What is the difference between cumulative lives lost after notification by the Coast Guard between the years 1996–2006 and 2007–2017?

Respectively, the hypotheses corresponding to the research questions were as follows:

- H_1 : No statistically significant difference existed between reported incidents addressed by the Coast Guard between the years 1996–2006 and 2007–2017.
- H_2 : No statistically significant difference existed between incident responses performed by the Coast Guard between the years 1996–2006 and 2007–2017.
- H_3 : No statistically significant difference existed between cumulative lives saved by the Coast Guard between the years 1996–2006 and 2007–2017.
- H_4 : No statistically significant difference existed between cumulative lives lost by the Coast Guard between the years 1996–2006 and 2007–2017.
- H_5 : No statistically significant difference existed between cumulative lives lost before notification by the Coast Guard between the years 1996–2006 and 2007–2017.
- H_6 : No statistically significant difference existed between cumulative lives lost after notification by the Coast Guard between the years 1996–2006 and 2007–2017.

5 Methodology

Data sets regarding Coast Guard performance were obtained from the Bureau of Transportation Statistics. The examined period consisted of data between the period encompassing the years 1996 and 2017. With respect to the examined period, the analyzed data categories consisted of: cases reported, incident responses (e.g., boating accidents), cumulative lives saved (rescue swimmers tending to personnel among disabled boats), cumulative lives lost (e.g., fatalities resulting from nature, such as hurricane responses), lives lost before notification (boating collisions), and lives lost after notification (victims dying while waiting for Coast Guard vessels to arrive after summoning assistance). The examined categories were delineated within the data set when it was obtained from the Bureau of Transportation Statistics.

Nag (2015) indicated that a strategic period encompassed an average of 5 years. Thus, the cumulative period examined within this study conformed to and exceeded the strategic period concept delineated by Nag (2015). Joyce (2014) indicated that an organization may be different at the end of a strategic period than it was at the beginning of the period. By using at least two strategic periods as the time frame for this study, perspective was gained regarding performance during the strategic period preceding the implementation of the legislation versus the strategic period afterward. The use of two strategic periods, one before and one after the legislation, provided a basis for understanding how mission performance changed through time.

Given fluctuations in the US population serviced by the US Coast Guard through time, the data sets were examined from a ratio perspective incorporating annual population. The ratio incorporated reflected the annual number of events and annual population per year with respect to ratios of incidents per 100,000 US population. Annual population data values regarding the examined period were obtained from the US Census Bureau.

The statistical approach for this study consisted of analysis of variance (ANOVA) to examine whether statistically significant differences existed in the examined data. Hypothesis testing consisted of the p -value approach with respect to a 0.05 significance level ($\alpha = 0.05$). The omega-square method was used to examine the effect size of statistically significant outcomes. Interpreting the effect size outcomes conformed to Field's (2013) criteria: small (0.01), medium (0.06), and large (0.14). Effect sizes were generated for all statistically significant outcomes.

An analysis of mean values of each category was performed to examine data directionality with respect to the cumulative period, incidents preceding the legislation, and incidents succeeding the legislation. Descriptive statistics, consisting of mean, median, standard deviation (SD), and variance, were used to provide measures of central tendency and dispersion.

6 Findings

6.1 Descriptive statistics and demographics

Descriptive statistics consisting of both measures of central tendency and dispersion were used to generate the demographic characteristics of the examined data. Table 1 shows the demographic characteristics of the cumulative data set. Table 2 shows the demographics representing the years between 1996 and 2006, whereas Table 3 represents the demographics between 2007 and 2017.

6.2 Hypothesis-testing outcomes

Hypothesis testing occurred through the use of ANOVA and p -value methods incorporating a 0.05 significance level. Four of the six tested hypotheses, namely, the first, second, fourth, and sixth hypotheses, showed statistical significance. The first hypothesis stated that no statistically significant difference existed between reported incidents addressed by the Coast Guard between the years 1996–2006 and 2007–2017. The second hypothesis stated that no statistically significant difference existed between responses performed by the Coast Guard between the years 1996–2006 and 2007–2017. The fourth hypothesis stated that no statistically significant difference existed between cumulative lives lost by the Coast Guard between the years 1996–2006 and 2007–2017. The sixth hypothesis stated that no statistically significant difference existed between cumulative lives lost after notification by the Coast Guard between the years 1996–2006 and 2007–2017. Table 4 shows each of the hypothesis-testing outcomes.

6.2.1 First hypothesis testing outcome

The first hypothesis, H_1 , examined the number of reported incidents throughout the examined period. The hypothesis

Tab. 1: Measures of central tendency and dispersion

Item	Reported incidents	Incident responses	Cumulative lives saved	Cumulative lives lost	Cumulative lives lost before notification	Cumulative lives lost after notification
Mean	28,479.32	47,374.80	4,425.95	691.23	481.86	209.36
Median	27,808.00	47,070.00	4,145.00	669.50	461.50	187.50
SD	9,381.40	5,687.70	774.22	115.05	90.81	50.72
Variance	88,010,583.56	32,349,946.38	599,420.71	13,236.28	8,246.12	2,572.34

SD, standard deviation.

Tab. 2: Performance preceding measures of central tendency and dispersion (1996–2006)

Item	Reported incidents	Incident responses	Cumulative lives saved	Cumulative lives lost	Cumulative lives lost before notification	Cumulative lives lost after notification
Mean	36,693.00	50,861.91	4,440.82	723.73	487.73	236.00
Median	37,218.00	50,622.00	4,010.00	701.00	454.00	219.00
SD	4,762.02	4,262.45	949.10	150.23	120.15	59.30
Variance	22,676,867.00	18,168,456.49	900,790.56	22,568.82	14,436.62	3,517.00

SD, standard deviation.

Tab. 3: Performance succeeding measures of central tendency and dispersion (2007–2017)

Item	Reported incidents	Incident responses	Cumulative lives saved	Cumulative lives lost	Cumulative lives lost before notification	Cumulative lives lost after notification
Mean	20,265.64	43,112.78	4,411.09	658.73	476.00	182.73
Median	19,856.00	43,954.00	4,188.00	655.00	469.00	182.00
SD	3,704.50	4,118.88	597.92	53.89	52.96	18.00
Variance	13,723,306.65	16,965,210.94	357,506.89	2,903.62	2,804.60	324.02

SD, standard deviation.

Tab. 4: Hypothesis-testing outcomes

Hypothesis	Item	p-Value	ω^2 Effect size
H_1	Reported incidents	0.00*	0.77
H_2	Responses	0.00*	0.59
H_3	Cumulative lives saved	0.19	–
H_4	Cumulative lives lost	0.02*	0.18
H_5	Cumulative lives lost before notification	0.18	–
H_6	Cumulative lives lost after notification	0.00*	0.33

*Significance level = 0.05.

testing revealed a statistically significant difference ($p=0.00$; $\alpha=0.05$) between the reported incidents addressed by the Coast Guard between the years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was rejected. Per Field's (2013) criteria, the effect size ($\omega^2 = 0.77$) was deemed to be strong. An analysis of the mean values showed a mean of 12.98 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 6.49. Thus, a decrease of reported incidents was apparent between the examined periods.

6.2.2 Second hypothesis testing outcome

The second hypothesis, H_2 , examined the number of incident responses throughout the examined period. The hypothesis testing revealed a statistically significant difference ($p=0.00$; $\alpha=0.05$) between the incident response quantities exhibited by the Coast Guard between the years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was rejected. Per Field's (2013) criteria, the effect size ($\omega^2 = 0.59$) was deemed to be strong. An analysis of the mean values showed a mean of 17.94 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 13.88. Thus, a decrease of incident responses was apparent between the examined periods.

6.2.3 Third hypothesis testing outcome

The third hypothesis, H_3 , examined the number of cumulative lives saved throughout the examined period. The hypothesis testing revealed no statistically significant difference ($p=0.19$; $\alpha=0.05$) between the number of cumulative lives saved exhibited by the Coast Guard between the

years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was retained. An analysis of the mean values showed a mean of 1.56 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 1.40. Thus, a decrease of cumulative lives saved was apparent between the examined periods.

6.2.4 Fourth hypothesis testing outcome

The fourth hypothesis, H_4 , examined the number of cumulative lives lost throughout the examined period. The hypothesis testing revealed a statistically significant difference ($p = 0.02$; $\alpha = 0.05$) between the number of cumulative lives lost exhibited by the Coast Guard between the years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was rejected. Per Field's (2013) criteria, the effect size ($\omega^2 = 0.18$) was deemed to be strong. An analysis of the mean values showed a mean of 0.25 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 0.21. Thus, a decrease of cumulative lives lost was apparent between the examined periods.

6.2.5 Fifth hypothesis testing outcome

The fifth hypothesis, H_5 , examined the number of cumulative lives lost before notification throughout the examined period. The hypothesis testing revealed no statistically significant difference ($p = 0.18$; $\alpha = 0.05$) between the number of cumulative lives lost before notification exhibited by the Coast Guard between the years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was retained. An analysis of the mean values showed a mean of 0.17 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 0.15. Thus, a decrease of cumulative lives lost before notification was apparent between the examined periods.

6.2.6 Sixth hypothesis testing outcome

The sixth hypothesis, H_6 , examined the number of cumulative lives lost after notification throughout the examined period. The hypothesis testing revealed a statistically significant difference ($p = 0.00$; $\alpha = 0.05$) between the number of cumulative lives lost after notification exhibited by the Coast Guard between the years 1996 and 2006 and the years between 2007 and 2017. Thus, the null hypothesis was rejected. Per Field's (2013) criteria, the effect size

($\omega^2 = 0.33$) was deemed to be strong. An analysis of the mean values showed a mean of 0.08 for the period between 1996 and 2006, whereas the mean for the period between 2007 and 2017 was 0.05. Thus, a decrease of cumulative lives lost was apparent between the examined periods.

7 Discussion and future research

Four significant findings were observed that represented differences in the number of incidents, incident responses, cumulative lives lost, and lives lost after notification. Differences in the quantity of incidents were observed between the examined periods, with fewer shown in the latter period. Since fewer incidents occurred in the latter half of the examined period, fewer responses occurred commensurately. It appeared that the Coast Guard and Maritime Transportation Act of 2006 may have contributed toward the long-term goal of enhancing mission performance.

Such findings may be explained by improved navigation and communication systems among vessels and the use of boating safety and education classes through time. Other reasons may include increased use of safety measures among vessels and their occupants (e.g., increased life jacket use), as well as the adapting and integrating of emerging technologies (e.g., new propulsion systems) (Coast Guard, 2019). Another factor may have been Nature itself. Since the Coast Guard responds to natural disasters (e.g., hurricanes), fewer natural incidents may have occurred during the latter period. It was beyond the scope of this study to examine natural incidents. Future studies may consider investigating such perspectives.

Prevention policy and programs may also account for the discovery of significant differences and quantity reductions between the examined periods. Recent examples include the mandated Maritime Transportation Security Act inspections, small vessel examinations, container safety inspections, compliance inspections, correcting discrepancies to navigational aids, credentialing and endorsing of merchant mariners, icebreaking, waterway control, pollution investigations, performing enforcement actions when violations are discovered, and security inspections (US Coast Guard 2019). Such examples were aligned with the mission performance enhancement goals delineated within the Coast Guard and Maritime Transportation Act of 2006.

Another consideration was the use of applied research and analysis. For instance, the Coast Guard analyzed

about 20 years of historical data to examine factors that contributed to recreational boating death rates (US Coast Guard 2019). Machine learning models were used for predicting potential recreational boating deaths as a certain form of boating accident (US Coast Guard 2019). Through the use of such analytical tools and resources, preventive methods could be better crafted toward the primary goal of saving lives during incident response, as well as for implementing organizational strategies for policy, programs, and operations.

The Coast Guard is the solitary maritime military service housed within the Department of Homeland Security. Its responsibilities are diverse and involve both civilian and government venues. Its scope of responsibilities includes the following: response operations; law enforcement; boating and marine safety; interdiction; search and rescue; aiding navigation; support for the US Navy, peer military services, and law enforcement entities; environmental protection; security for ports, waterways, and coastal areas; and defense operations (US Coast Guard 2021a). Coast Guard operations are affected by economic principles and tenets regarding optimal resource allocation toward mission fulfillment. For instance, it must prioritize its missions, such as interdicting drugs, responding to disasters, or boating safety (Lewis 2017). Future studies may examine the economic allocation methods used to facilitate mission operation and performance.

This study lacked consideration of the legislation from its historical significance within the context of national security policy or public policy. Given such a notion, from the perspectives of historical and policy analyses, McElreath et al. (2021) indicated that 2 decades of data were appropriate for examining and understanding historical contexts of phenomena. Thus, when sufficient time has passed, future studies may examine the legislation from various policy perspectives.

8 Conclusion

The reviewed literature showed an absence of discussions related to the mission performance of the US Coast Guard with respect to the impacts of legislation. Therefore, this study attempted to provide some basis for understanding its mission performance with respect to the Coast Guard and Maritime Transportation Act of 2006. The analytical method consisted of ANOVA with respect to a 0.05 significance level. Based on the statistical analysis, it appeared that fewer reported incidents and responses occurred after

the passage of the legislation. It also appeared that fewer lives were lost cumulatively both before and after US Coast Guard notification. Given such outcomes, it appeared that the legislation affected mission performance. The study addressed US Coast Guard performance across the period between the years 1996–2006 and 2007–2017. The study considered the Coast Guard and Maritime Transportation Act of 2006 from Nag's (2015) context of strategic period with respect to characteristics of mission performance. By examining the strategic period before the legislation versus the strategic period afterward, some understanding of how the implementation of the legislation affected mission performance was gleaned.

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