



Feedback Mechanisms in Public Administration Under Cybernetic Theory: A Comparative Discourse on Feedback Mechanisms in Islamic and Pakistan's Public Administration

Syeda Lalarukh

PhD Scholar (Administrative Sciences), Institute of Administrative Sciences, University of the Punjab, Lahore, Pakistan

* Corresponding Author: **Syeda Lalarukh**

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Abstract

The following study has employed cybernetic theory and its principles using thermostat analogy to study a comparative analysis of feedback systems in public administration systems of early Islamic administration and that of Pakistan in current time. Their feedback loops and regulatory power have been studied through deconstruction into individual components. Analysis reveals that both the systems are complex and multilayered according to their time periods. Islamic feedback system has a dynamic equilibrium in contrast to the Pakistani system that is more inclined towards a broken and open loop. Findings highlight the need to further this research and use the principles applied here for self-correction and make administrative components and systems more responsible.

Keywords: Islamic public administration, Pakistan public administration, feedback mechanisms, cybernetic theory.

Introduction

Effective and efficient public administration requires thorough investigation of feedbacks carried out from public, senior administration and various accountability measures (Brenninkmeijer, 2016) This is essential to make sure the policies and public service is getting delivered at targets and not been done blindly, since it requires constant oversight and inputs. It allows leaders and decision makers to steer the policies in correct directions.

This research is going to explore the feedback mechanisms being an essential feature of public administration and how they were generally structured out in early Islamic Public Administration and in current Pakistani Public Administration. Their comparison will give us a comparative picture both systems and the examination of contemporary and historical contents will make this study aim for the identification of key aspects, challenges and lessons learned from Islamic governance being an exemplary model for mankind. The institutional, external and ideological feedback mechanisms will be studied from the existing literature of Islamic public administration and how it worked out through practical examples. Public feedback and immediate actions on complaints through Shura or consultation among the highest authority are worth mentioning. In contrast, the feedback system in Pakistan's context will be studied through existing literature and document analysis. Background shall be built by studying feedback mechanisms carried out around the world, especially in the developed countries such as USA and Singapore. International feedback mechanisms will make us able to understand the variety of techniques adopted as per the other country's local context. Singapore has been chosen for being a developed Eastern state with western principles of efficiency and transparency, especially the initiatives such as the "public consultation portals", "Smart Nation initiative" and citizen satisfaction frameworks.

The cybernetic theory will give a perspective on how the administrative system regulates itself by making "listen and respond" a part and parcel of the feedback process, and the theory will be used to analyse the results generated by comparative analysis. The paper will analyse online websites, articles, policy documents, historical literature, and books for the extraction of feedback mechanisms of the target systems. Qualitative design has been chosen for this study along with the comparative analysis of the feedback mechanisms of Early Islamic public administration and Pakistan Public Administration.

The findings will help the researcher to dive deep into structures of feedback mechanisms and how the governance structures can be studied using theories like that of cybernetics and policy makers can better become self-reflective to study the policy outcomes using simpler models.

Literature Review:

For keeping order and prosperity, government as a complex system steers the society (Cairney, 2015). Cybernetic model has been used in this study as this model can aptly explain the feedback mechanism in governance as a dynamic control system. Flow of information is a source of power flow, a chance to develop the system of governance on the road to progress.

Feedback system is one of the most important parts of public administration, providing real time, critical data in the form of input on service delivery deficiencies, the effectiveness of policies implemented and at what rate of satisfaction the citizens are receiving those policies. Through a variety of channels, these structured feedbacks not only help the government to adapt and autocorrect in future, but also help to align the resources towards the target in a way that public is satisfied, their trust remains and all the policies and programs get implemented in its true sense. (Brenninkmeijer, 2016) ^[11] Hence citizens, the end users, the beneficiaries of all the policies are the active participants as they help the system of public administration to achieve its true goal, i.e. public welfare.

Some examples include the digital governance platforms in Estonia that allows public to report issues and the same source is used to provide government responses too, helping to track them (Espinosa & Pino, 2025) This creates a transparent and closed loop system. Singapore has an initiative running successfully, called REACH, and is directly linked to the central legislature (REACH, 2025) Here the citizen inputs and reports on policies are received via in person consultations, or through online system. Better Reykjavik online platform of Iceland if made to take propositions and let the citizens debate on ideas for urban improvements (Bowlsby, 2019) ^[10]. Most of them are funded and implemented by city administration. These examples show the efficacy of technology to gain inputs from citizens, and also proves that citizen feedbacks are needed for development as they know better what came out of a policy and how it is affecting the society. Their inputs and novel ideas make them an active actor to transform a state towards development.

Importance of feedback system in public administration

Feedback needs to be part of the system, in an organized way, or else it is just an unstructured, overwhelming and mere cry from the citizens that is ignored when not considered as an actual input. Organized system has different components, priorities, and classification or filtering systems to recognize the suitable actuators for the resolution of the highlighted

problem (Brenninkmeijer, 2016) ^[11] What protocols will be used, the timeline of the resolution process, people to be held accountable and how the input is going to get translated into action or whether a completely new policy needs to be devised, is established when system is organized. So that the feedback can be filtered out whether it is relevant or just a cry created by rebellious or ignorant voices. That is why feedback needs to be mechanised, and governance systems require a feedback mechanism if public has chosen them as their representatives and now want their opinions added to this representation to decide whether their needs are getting fulfilled. (Burton, 2025)

Citizens are the main sensors of the administrative system (Kowalski *et al.*, 2020) Ground level data regarding what works and what fails is provided by those present on that level. Accountability could be made a reality through consistent citizen's feedback. A feedback loop is formed eventually.

There are various types of feedback systems based on their nature and flow. There can be formal channels for this purpose, like public and court hearings, audits, online complaint portals, ombudsman offices. Informal channels are those where grievances are outspoken, such as protests, physical and social media campaigns. Media plays a main role by scrutinizing through the details of topic under discussion. Point of origination of feedback can be both external and internal. External feedback arises from citizens, activist groups, non-governmental organisations and businesses. Internal feedback is collected from state institutions such as bureaucracy, local government bodies, law enforcement agencies, where hierarchies are reported and performance is scrutinized. (Maracha, 2016)

Scientific theories and models used to explain social science concepts provide subject experts in policy making machinery at public administration level an approach to understand systems. So that when social systems are taken as physical systems, each organ of that system can be revitalised and rectified to make that system more effective and efficient. The outcomes expected of that system can be objectified to various tests to make a complete structured system that is moving at a consistent pace (Bhandari, 2023) ^[7] (Bhattacharjee, 2019) ^[8]

Theoretical Framework, the Cybernetics or the Cybernetic Theory:

What are cybernetics:

Cybernetics itself is a transdisciplinary study of how systems regulate themselves, achieve goals use communication and control to maintain stability (Wiener, 2019) From the Greek word *kybernetes*, the word has been extracted, which means steering. For the feedback systems, this is to study the use of information in the form of feedback to adapt to the changing, dynamic environment, concerned majorly with the "circular causality", i.e. how the system under study incorporates the feedback collected as a renewed input, and the subsequent

behaviour and policies are influenced accordingly, thereby continuing the loop. (Pay, 2022) (Wikipedia, 2025a)

Core principles of cybernetic system with a feedback loop:

This theory is operationalized through a control loop that has three major working components (Wikipedia, 2025a). The goal (set point) in cybernetic meaning is the desired state of the system that is meant to be achieved. In our case, it would be the temperature of the thermometer.

Sensor or monitor: measures the systems outputs on the environment, much like data gathering through eyes and ears. **Comparator** receives data gathered from the sensors and compares it with the pre-established set points or goals. Error is calculated and what went wrong, in between the actual results obtained and the desired performance expected.

Actuator or Effector is the executes the commands meant to stabilize the system. It puts efforts to reduce the errors and align the performance with the desired goals as per the requirements of the environment.

The Black Box principle: in cybernetics, this is an important approach where systems which are complex with internal working not completely known are termed as "black boxes". Then only the inputs and the outputs can be studied in correlation on the basis of different stimuli influencing the system, rather than the unobservable internal mechanisms. (Wikipedia, 2025a)

Dynamics of the Systems Under Cybernetics and Behavioural Adaptability

Cybernetics is all about how systems under focus maintain their workability in dynamic environments. Stabilizing the internal conditions in such environments requires a capacity to adapt, known as homeostasis. This requires flexibility for adaptation and learning. Looking into the law of requisite variety by Ross Ashby, he argues about the effective control requires the controller to have equal flexibility like that of the system (Ashby, 1957) ^[4] Response capacities need to be humble enough in the simplest systems to counter the complexities of any environment.

Applications Across Various Disciplines

Diverse fields have successfully integrated cybernetic theory as a transformative research model. Its concepts provide frameworks for creating understanding about the system achieving stability and adaptability. (Bigirimana, 2023) ^[9]

For instance, there are biological systems that can use cybernetic principles in processes such as homeostasis where the regulation of temperature, blood sugar, hormonal balances, etc. despite of all the external fluctuations, the inner vital conditions of these biological feedback systems are kept within the range for survival. In technology and AI Artificial intelligence, from simple thermostats to high fi robots, cybernetics provide applications in algorithms to improve performance through feedback loops and control systems. (Ashby, 1957) ^[4]

In Management studies, cybernetics provided frameworks for the organizational structures in decision making and information flows. For maintaining a stable organization while adapting to all the changing environments, Beers viable system is a commendable work. (Bigirimana, 2023) ^[9]

In ecological systems, predator and prey relation can be explained via the feedback system under the cybernetic principles. Understanding regarding Social systems can also be built concepts of networking and regulatory frameworks created by laws, norms, cultures, traditions and institutions.

Application of Cybernetics in Public Administration:

In public administration, it would be the core objective for which the policy was devised in the first place. For example, it could be the target of literacy to be achieved in a number of years, the service delivery through some infrastructural initiative or some target set for the trees to be reforested.

Like reading the room temperature, a sensor in public administration feedback system would be the sources through which the data is gathered and analysed on the effectiveness and outcomes of the policy implemented. The mechanisms that gather data would be the sensors, such as the complaints through online portals or in person surveys (Nizam Al-Mulk, 2006, p. 71) by the government, audit reports, field reports and civil servants working with the community. Media platforms and social media are the most hyped sensors, working as the eyes and ears for the government (Sharma, 2009), collecting the real time data through their own investigations and sharing on public platforms such as news, websites, journals, articles, research writing, etc. Researchers in public consortiums, policy making institutions and at university level can also work as a sensor when they do thorough research on the problems faced by the concerned stakeholders (Droptought, 2025)

Comparator at public administration level would be the policy makers, parliamentary committees, policy analysts, auditors and ombudsmen people. They work as a comparator as they review the data gathered by the sensors, and compare it with the actual policy goals and statistics that were formulated, to identify what gaps are there, what deficiencies exist in the design of the policy and how the real time data collected after can help in revising the policy or the program made.

Actuator in the administrative area would be like that in the thermostat, working on the negative feedback. It can be the decision-making official such as a governmental body, a ministry or judiciary. This part involves the execution of correction. the actions against the complaint received. For instance, a negative review collected on the distribution of funds would result in the reallocation if budgets, a complaint received on the program initiated would result in the reformation of the flawed program. Or it can lead to passing a complete new set of policies, strategized through a new approach.

Feedback loop would be formed where cycle is formed, from identification of a problem till rectifying it. Citizen's complaint is analysed; correction is made in the system or the policy. An incomplete loop that is broken at any point, it could be when feedback is not taken seriously, not acted upon and not inculcated in the system leads to administrative failure and decay of the system altogether.

Thermostat Analogy to explore cybernetic principles:

Thermostat, a regulating device, is an elegant yet simple illustration to use as a comparative analogy for the detection of core cybernetic principles. This operation is a common application in the temperature regulation in physical devices, households, buildings, offices, etc. (Harish, 2020)

Sensor in thermostat is the thermometer playing the role of continuous sensing and monitoring of current environmental state. Comparator or controller is for the comparison of input received and then embodying the knowledge entered in the system to detect any deviations from the standard set points. Error, if found, is corrected to normalcy by the actuator or effector, based on the measures given by the controller. Thus, a closed feedback loop has been created that maintains the homeostasis at regulatory levels. Here, the broken loop would be a wire that is severed to make it difficult for any components receiving the sensory signals. (Chakravarty, 2024)

Room temperature keeps on oscillating due to slow velocity of the furnace. If the thermostat placed in extreme conditions like direct sunlight, sensors distort the reading by catching only the microclimate of the sunbeam rather than sensing the whole room temperature. High gain is the phenomenon when the thermostat in a small room overshoots the temperature, becoming aggressive to quick and small changes.

Feedback Loop

From the stimuli, sensor, comparator, controller, actuator, the input received is circulated in the system to become a corrective output, forming a feedback loop.

Closed Loop: It will be a healthy, successful loop with correct action processed, if the loop is closed.

Open or Broken Loop: If any part of the thermostat system is not working, such as the sensor, the loop is broken or open, since the corrective action is not formed and the environment is in the same state.

Velocity: Velocity of the system would be the speed of which temperature is regulated as per the sensors. A slow system that has a delayed sense of taking action, and is outdated, would have a slow velocity.

Fidelity of the system: Fidelity can be the distortion in the signal when information received is false. For instance, any candle or a heating device put near the thermostat will give impression to it that the temperature is warm, thus letting the rest of the room remain cold.

Amplification is the power of the system. High gain would be a powerful system attached within a small room to raise temperature unexpectedly and overshooting the thermostat. Low gain is when the system never reaches the desired goal and works at its slow pace in a mismatched environment, only providing gentle heat. (Wikipedia, 2025b) (Amanda, 2019) [3].

Cybernetics in thermostat:

The thermostat shows cybernetic concepts through its working with great sophistication. A continuous loop of feedback, i.e. sensors measuring detecting temperature changes- controller detecting the deviations from set point- actuator addressing the deviations

- system regulates itself and sensors start sensing any temperature changes again. This circular causality is highly important in self regulating systems. (Stevens *et al.*, 2020) The thermostat has a range of temperatures as a "deadband", because perfect and precise temperatures are unnecessary. Effective regulation means tolerating slight variations and regulate the system to prevent extreme disruption through oscillations and expenditure if energy.

Law of Requisite Variety (Houston, 2001) has been illustrated via thermostat when it differentiates between required states of the temperature and respond accordingly. (Too hot, too cold, not much hit, acceptable). Sometimes a network of thermostats is required in a building management system, where every room requires variance in temperature regulation, adapting to environmental complexity.

1. Basic feedback mechanism in Early Islamic Public Administration: components of Administrative Thermostat:

The Shariah Principles (the Set point):

The set point in Islamic public administration would be the goal state meant to be achieved through the system of public administration, which if we make a crux, is the Shariah along with peace and human welfare, emphasizing the progression of Islamic principles and making life as per the guidance of Quran and the sunnah of the last Prophet (PBUH), the main goals include protection of life, faith and morality, justice and equality, basic human rights and the welfare of the citizens. (Egypt's Dar Al-Ifta, 2025) (Alias *et al.*, 2024) [2].

Hisbah, Courts and the Ruler (The Sensors):

The sensors are the institutions or organized bodies collecting data and both positive and negative feedback in the form of input from the public. As this is the governance structure for humans that we are talking about, hence the system will be multilayered. This would be the Muhtasib in the institution of Hisbah (ombudsman). His prime duty was to walk in the public sphere and monitor for any deviations occurring from the set point or the Shariah. It can be corruption, fraud, etc. this is an unstructured, random feedback that is processed through the institution meant to hold public servants accountable (Al-Buraey, 1985, p. 263) [1]

Then there are the Courts meant to provide justice against any complaint made that needs the interpretation of law to

provide just judgement. This is a processing of structured feedback where a ruler or a commoner can come to demand justice or address any grievance.

The third category is the direct access to the ruler. This is a mixed category, as the complaints can also come through hisbah and diwans, and the complainants were provided a direct, open channel to access the ruler. Rulers in the form of sultans, governors and the highest the Caliphs were supposed to be open to the public. (Al-Buraey, 1985) ^[1].

Caliph or the Ruler (The Controller):

The Controller here is the decision maker, deciding what would be the final verdict to make changes as per the types of feedbacks. These controllers were the Caliphs having jurisdiction over the entire Muslim ummah, a sultan having jurisdiction for a specific piece of land or a vizier authorizing a specific diwan. Though they are the controllers of their own authoritative areas, But the rulers later, and usually a Caliph at the time of early Islamic public administration, after the demise of last Prophet (S.A.W.) were the controllers of the system. They took the corrective action to bring the system adjusted to the normal, upholding the set points. (Nizam Al-Mulk, 2006, pp. 50–80)

Executives or Implementers (The Actuator):

The Actuators were the people executing the decisions made by the system controllers, such as the public servants including governors (wails), department heads, tax controllers (the amils), judges (Qazi) and Muhtasib. (Al-Buraey, 1985) ^[1] Here the Muhtasib can make decisions right on the spot, or wait for the Caliph to decide and then execute the final decision, based on the situation and gravity of the problem. So, the executives are based on the types of actions needed such as the Qazis for judicial decree and a caliph or ruler making new policies for policy adjustments based on the feedbacks.

2. Basic feedback mechanism of Pakistan Public Administration: components of Administrative Thermostat:

Policy goals and Constitutional Directives (The Set Point):

In Pakistan public administration, the set point is abiding by the constitution of Pakistan, by the rule books of individual ministries, departments, i.e. achieving the desired state required as per the situation. If the feedback is against any developmental policy, then the set point would be the plan for that policy. It can be the five-year plans, the federal budgets, and specific policy documents such as Vision 2025 (Planning

Commission, 2025) redefining the states constitutional objectives. It can be the detailed policies to achieve specific literacy rate, poverty alleviation, GDP growth etc. The feedback achieved shall be compared to the principles and plans mentioned in those policies and the constitution. This set is dynamic as the public policies keep on changing due to political instabilities, international agreements, elite interests and other conditionalities. (National Assembly of Pakistan, 2012)

Data Collection and data monitoring agencies, monitoring and Auditing departments (The Sensors):

Sensor here would be the organizations collecting the feedback, i.e. data collectors in the form of agencies dedicated for this purpose by the state. For instance, the data collected on employment, poverty or literacy is done by Pakistan Bureau of Statistics. Similarly, the ministries have their own research and development departments to collect and research for the relevant data, auditing agencies for financial feedback processing (Elahi, 2008) (Auditor General of Pakistan, 2012) ^[6] Ombudsman offices are also present at federal and provincial levels to hear public complaints against public service malpractices, but they have limited jurisdiction. Researchers at university, independent and consortium level are also sensors, but they are not mandated by the government. Media and Social media platforms also play an important role as sensors for the governmental departments (Sharma, 2009). Non-governmental organizations and activist groups are another form of passive sensors to get attention towards crucial societal problems (Ghani, 2015)

Decision-makers (The Controller):

Controller would be the decision makers of the state, i.e. the Cabinet, secretariats at federal and provincial levels, chief ministers for provinces and the Prime minister at the highest level, being the head of the government. They coordinate with their cabinets and data collection bodies while coordinating with international agencies to arrive at a decision acting as a comparator to work on all the deviations from the set policy goals.

Executives or Implementers (The Actuators):

The actuator here would be the bureaucracy of Pakistan, the one that implements the governmental decisions. Here the ministries and line departments have their own implementation arms, and local governments are responsible for municipal services. Semi-autonomous bodies have their own implementers, and so do the autonomous bodies, such as WAPDA.

Table 1: Comparative analysis of feedback mechanisms in early Islamic and current Pakistan's public administration

Components	Thermostat Analogy	Feedback system in Islamic Public administration	Feedback system in Pakistan's public administration
Set Point	Desirable and appropriate temperature range	Principles of Shariah, i.e. principles of justice, public welfare and protection of life, wealth and property as per the instructions of sovereign, Allah Almighty	Policy goals and constitutional directives.
The Sensor	Thermometer	Muhtasib (hisbah), courts and Shura, receiving complaints, reports through active and passive means	Physical and online complaints, surveys, reports, researches. Media, NGOs, activist groups.
The Controller	Pre-programmed system that activates or decreases the heat or the temperature and regulates the furnace.	Ruler, Imam and the Caliph based in their jurisdictions, acting as a hub of wisdom and intelligence to interpret feedback.	Secretaries, cabinet, chief ministers, legislature (parliament), prime minister.
The Actuator	Heater or cooler, i.e. a device with simple on and off function.	Implementation arms, the executive, public servants, qazis, to implement the decisions.	Bureaucracy, board of governors, separate implementers in autonomous and semi-autonomous bodies such Assistant Directors.
Feedback loop	System responds or it doesn't. Loop is closed, open or broken	History supports a closed loop through successful narrations as per the system is concerned. Prone to corrupt officials and rulers, hence breaking the loop but temporarily.	Accountability mechanisms, performance indicators and removal, transfer or punishments for public servants. Studies showing broken and open loops in larger number.
Core design	Ideal environment is homeostasis through negative feedback.	Designed for both Negative and positive feedback to keep the system motivated, dynamic and progressive.	Designed for both negative and positive feedbacks to reprimand or promote the public servants accordingly. Growth indicators, surveys, reports showing positive response from people

Both systems have been explained via thermostat analogy and its components have been accurately compared with that of the components of the thermostat to make sure the feedback loops and homeostasis state can be studied with clarity. As per the literature review and analysis of documents, journal articles and all the relevant literature, the only way to know whether the system mentioned have closed or open feedback loops is through critical, analytical studies on accountability and feedback systems in case of Pakistan, and through case studies mentioned by Nizam-ul-Mulk in his book of 9th century, "Siyasatnama" (Nizam Al-Mulk, 2006). For this study, they have been mentioned as follows:

Accountability and Policy Reviews (The Feedback Loop) in Early Islamic Public Administration:

The Feedback loop in the Islamic public administration turned out to be a continuous loop where the actuators executing the change in the environment to adjust to the feedback received. It gives a start to a new state, which can be the allocation of a new public servant, a village finding justice, a person gaining his or her rights and property back, or the revival of the whole ummah back to the Shariah abiding state after a war with the trouble makers. (Nizam Al-Mulk, 2006, pp. 64–77)

The main temperature adjustment is when the trouble makers were held accountable or reprimanded according to the rules of Shariah. A number of narrations have been done by Nizam-ul-Mulk to show a closed feedback loop created in the Islamic administration.

One of them is how a corrupt amir paid all his debt taken from a merchant when he complained to a pious tailor, who appeared to be one of the trustworthy of the Caliph when he once exposed an amir's crime to the caliph. This shows a

closed feedback loop where public complaints created a trigger for caliph to act ensuring justice and regaining public trust. (Nizam Al-Mulk, 2006, pp. 70–85)

Another mention includes the hiring of postmasters or intelligencers to keep an eye on public servants in case of any complaints. For minor problems such as theft of a chicken, they spied extensively so that no unjust action went unnoticed. Even the Dalamite king used to disguise as a commoner, vendor or Sufi etc to secretly monitor for any corruptions. (Nizam Al-Mulk, 2006, pp. 71–75)

To mention one more case, how Hazrat Umar (R.A) immediately removed the most able and talented jew tax collector when he misbehaved with the public (Nizam Al-Mulk, 2006), even though nobody was more competent than him showed a high velocity, lower fidelity, closed feedback loop. That makes it a closed loop system, with negative feedback in the form of grievance sand complaints maintaining the homeostasis of the system.

Accountability and Policy Reviews (The Feedback Loop) in Pakistan's public administration:

Feedback loop in Pakistan Public Administration is not a direct closed loop, but an open disrupted loop, influenced by a variety of disruptions to not let the system achieve homeostasis.

As shown by the evidence through reports, it can be observed that there are some systems where sensors work for collecting the feedback, but does not create a closed loop as no correction has been made due to disruptions such as corruption and patronage. Studies on diagnosing corruption in Pakistan has a key finding i.e. weak accountability methods are a source to corruption (Iqbal & Mustafa, 2023). And working on feedback requires a robust feedback

mechanism to hold the public servants accountable for not delivering justice to their duties, as a result of which the public is full of complaints and negative feedback. This leads towards corruption, that is also a disruptive factor that counteracting by influencing back the feedback system. This makes feedback system to be highly efficient and robust that disruptions cannot get in the way. So, corruption is both an external disruption as well as a negative set point contrary to the standard set point.

Research highlights that grievance redress mechanisms in health and education sectors are open loops, where complaints are not followed up and no punishments for ignoring those feedbacks. Actuator fails to engage with the feedbacks, another broken component in the system. This shows broken loop at implementation where external stimuli failed to change the defective system (Butt *et al.*, 2025)

Studies have shown that another feedback loop of patronage that runs as an essential form of input for the actuators or the bureaucracy of the rest of the feedback loops. They act as a deviation from the set point as the political loyalty, some international demands or elitist demands become the main source of feedback (Aslam *et al.*, 2023) ^[5] For Pakistan, the hierarchical system in bureaucratic structure residing in every government and ministry department, displays slow velocity and signals are distorted by pressures from senior hierarchy and political influences, thereby displaying high distortion and the system remains deaf to the input received. This makes it a broken loop.

This proves informal channels disrupting the formal administrative feedback system, act as a competing power source in a building management system.

Analysis and Findings:

Looking at the comparative oversights, the sensors in both case studies are in large numbers. This shows the complexity of the feedback system in public administration and how a large number of data gathering stimuli exist when it comes to a social structure. Islamic system of classical times had intelligence agents, muhtasib, courts and diwans, sometime directly caliphs that were monitoring and keeping oversight whilst listening to the complaints in their courts. In case of Pakistan, fourteen hundred years later, sensors have increased in number with media, social media and activists going out of their ways to bridge information from citizens to the relevant government departments. Then there are think tanks, research institutes, non-governmental organizations for health, education, water, environmental problems.

For the whole network of thermostats, muhtasib works as a highly effective sensor with great velocity and minimal distortion. Even if it receives mix signals, the phases of controller or the Caliph, the Governors and the shura is

competitive enough to make sure the feedback has been processed till it is justified and then corrective action was taken.

But some of the feedback systems have achieved closed or near close loop by improving their working and velocity plus amplification of their complaint processing.

Type of feedback:

The emphasis in this study on the government solicited feedback, i.e. feedback meant to keep the system of administration stable by keeping the loop of accountability active. This is done by deliberately collecting data from the in person public surveys, research reports, auditing etc.

Citizen initiated feedback is a mixed feedback system that directly addresses immediate needs, in justices and grievances, not necessarily related to the administrative regulation, but indirectly addressing the performance and negligence of public servants, civil servants and departments meant to provide basic rights, justice and fulfill basic needs in the first place.

The principle of requisite variety suggests that administrative systems must develop diverse response capacities matched to the complexity of social challenges. Simple, one-size-fits-all solutions often fail when applied to multifaceted public problems. A cybernetic perspective encourages viewing governance as an adaptive learning process rather than a static bureaucratic structure. Policies become hypotheses to be tested through implementation, with subsequent adjustments based on observed outcomes.

Difficulty of Thermostat analogy for complex systems results in a tiered structure:

Basic thermostat model is an appropriate tool to understand the principles of cybernetic theory, but its simplicity and a single loop model is insufficient to explain the real-world systems, like that of the public administration system. The feedback Mechanisms explained by NizamulMulk and Al-Buraey for the government on the whole can be better understood by a network of thermostats in the form of Building Management System for the building of caliphate in the form of multiple thermostats for different feedback types. Every institution, i.e. the Hisbah, Mazalim courts and diwans function as separate thermostats for the specific domains for which they are responsible to monitor and regulate to achieve the overall set point (Al-Buraey, 1985) ^[1] But the Central authority and the set point of Shariah is where they all are oriented. Same is the case with Pakistan's system, where the variety of departments, autonomous and semi autonomous bodies under each ministry are the thermostats working separately to achieve a single policy goal.

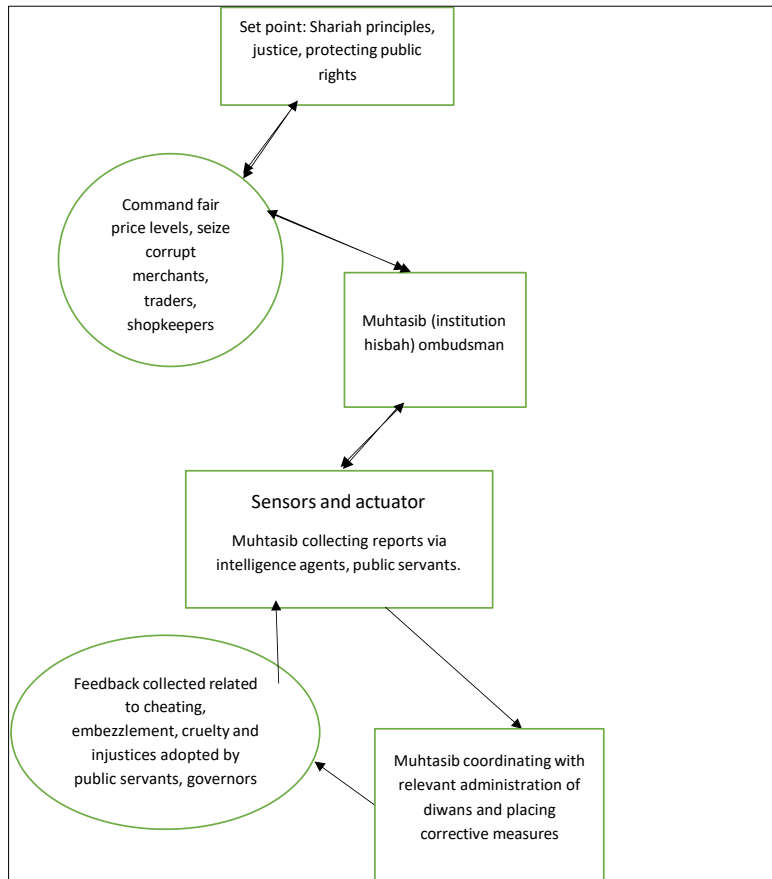


Fig 1: Visual representation of a single loop feedback system

For instance, this is a single feedback loop from a single feedback system regulating itself. Citizens are the primary source of info collected via oversights through intelligence

agents and complaints, are coordinating with ombudsman or relevant diwan to place corrective measures.

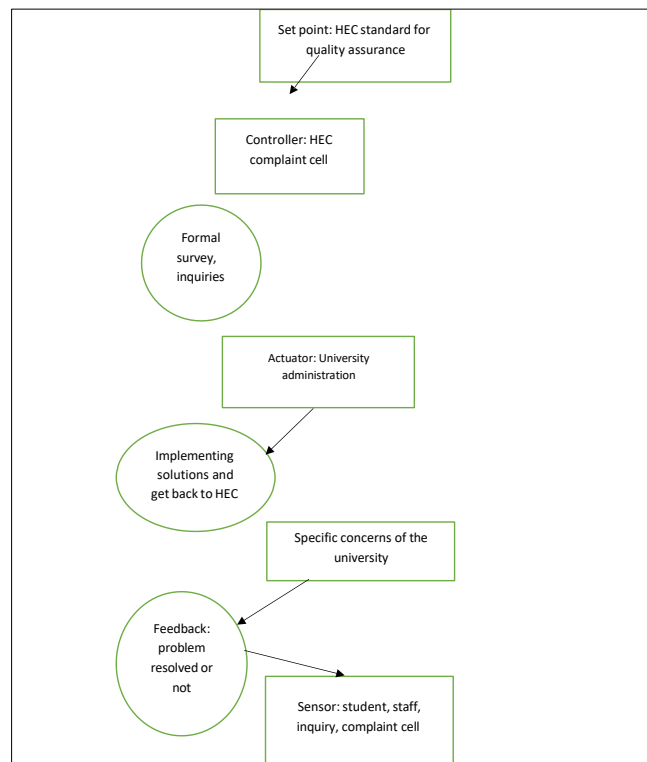


Fig 2: Visual representation of a single loop feedback system

As an imagined feedback loop in Pakistani context, this system acts as an HEC (higher education commission) thermostat for university quality. When a student releases the "temperature" (education quality or other factors) is wrong at their university, they can adjust the thermostat by complaining to HEC through complaint cells. HEC then signals the university (the heater/AC) to resolve the problem, and it keeps monitoring until the environment is back to the correct standard.

Sophisticated network of feedback loops:

The above visual representation was shown to explain that a single feedback loop suits for a simple type of feedback. Feedback mechanisms in public administration consists on a sophisticated network of feedback loops, each serving different purposes, located in different departments and working in a different environment and time scales. For instance, in Islamic public administration, feedback loop for grievances is addressed by judicial loop of complaints, courts, Qazi and judges. For complaints against corruption and injustices by public servants will have an accountability loop that includes citizens, intelligencers, hisbah, diwans, shura and caliph. This loop maintains the health of the entire state by keeping an eye and swift accountability of public servants.

In the Pakistan's system, there are even more feedback loops. For public grievances there are consumer, high and supreme courts. Then ministries with their individual jurisdictions have their own feedback systems such as citizen complaints cells, online portals, SMS systems, mailboxes. For instance, the Ministry of human rights has their own helpline, the Federal board of revenue (FBR) (FBR, 2025) has a feedback email. Ministry of Foreign Affairs (MOFA, 2025) and NADRA (NADRA, 2025) have online complaint management systems.

Autonomous bodies and other provincial departments have their own feedback and monitoring systems. Such as the Punjab Information Technology Board has an SMS system to collect trends in service delivery.

Complexity of the system:

Due to the complexity of governance structures, researcher cannot call the feedback system of public administration as a single thermostat, rather it is a complex network of thermostats managing the feedbacks of all the departments individually, much like rooms in a single building of accountability and policy corrections. The multilayered supportive design is practically depicts the "Law of Requisite Variety" (Houston, 2001) in cybernetics, where regulatory capacity must be ensured akin to the complexity of the system. Law states that the system must be capable enough and have the capacity to manage all sorts of disturbances and sensing. A large variety of actions must be there to control the whole system. Seeing the above- mentioned analysis, a network of thermostats in public administration must be interconnected to take action on feedback gained as an input via sensors, like a variety of essential mechanical devices making up the Building Management System (Holbert, 2025).

Conclusion, Learning outcomes and limitations:

Thermostat analogy can be regarded as a sophisticated approach to get valuable insights form governance structures. Importance of self regulation through closed or broken loops has been studied and can be further studied in detail for future researches on single departmental workings and feedback types. This has given the idea that social systems must be created in a way that they have the capability adjust, much like a thermostat adjusting temperatures. Even with the complex nature of governance, researcher has tried to explain the alternative explanations in the findings to make sure all possibilities are explained.

Practical implications include focusing on system designs and structures, so that they get enabled to respond appropriate to the environment. This can improve decision making processes, checking and monitoring performance and make the accountability systems much efficient. Each structure in governance system can be simplified through this model to identify problems effectively.

Talking about the limitations, this study can be considered by some as the oversimplification of complex governance structures, or the use of abstract ideas to explain complex human factors and societal complexities.

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