Systems Approach to Defence Capital Acquisitions in India

Vikram Taneja

The Indian acquisition ecosystem in these times is revelling in its newfound vibrancy thanks to a beneficent infusion of fresh policy. The Government of India, in the last two years, has cleared a substantial number of capital acquisition cases, and launched many enabling initiatives, thereby ushering in a positive acquisition organisational climate.[1] Though these measures will take time to transform into physical acquisitions[2] and finally into capability, the ball has been set rolling and if the latest capital allocation to the Budget Estimates (BE) 2016-17 is disregarded[3], it can be assumed, albeit with some caution, that arming the Services remains a priority for the government. On the other hand, unfolding of some of the major contracts beyond the Defence Acquisition Council's (DAC's) '*in principal approval*' does not do much to assuage the concerns of the end user. Top priority procurements such as of the assault rifles have been rebooted with the withdrawal of the Request of Proposal (RFP) in 2015.[4] The contract for bullet-proof jackets urgently required by the Army still remains to be inked.[5] Certain other leading acquisitions, namely, the M777 howitzer deal and the recently cleared utility helicopters are being progressed with Russia under the 'Make

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N.B. The views expressed in this article are those of the author in his personal capacity and do not carry any official endorsement.

in India' programme bypassing the Defence Procurement Procedure (DPP) through the Inter-Governmental Agreement (IGA) or Foreign Ministry Sales (FMS) route which is certainly not an appropriate testimony to the DPP's performance as India's all encompassing capability development manual.[6]

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An extensive process reengineering is on the anvil with the new DPP 2016 expected to be promulgated in April this year.[7] The shape of things to come is already being foreshadowed through relevant policy pronouncements such as the new offset policy, which articulates enhancing the offset threshold from the existing one to INR 2,000 crore and the announcement on the introduction of Indigenously Designed, Developed and Manufactured (IDDM) equipment as a proposed category for acquisition.[8] In essence, the revised DPP envisages to provide a boost to the government's 'Make in India' initiative, enhance the involvement of the private sector, build indigenous design and development capabilities, promote absorption of world-class technologies, provide premium consideration to high quality products, promote the growth of the Micro, Small and Medium Enterprises (MSME) sector, reduce time lines across various stages of procurement in addition to procedural refinements effected to enhance the efficiency and effectiveness of the procurement process.[9]

Relevance of the Systems Approach to Defence Acquisitions

It needs no elaboration that the domain of high value defence

The new offset policy, which articulates enhancing the offset threshold from the existing one to INR 2,000 crore, envisages to provide a boost to the government's 'Make in India' initiative, enhance the involvement of the private sector, build indigenous design and development capabilities, and promote absorption of world-class technologies.

procurements spans much beyond the mere procedural domain.[10] The organisational structure which has a major role to play in defence capital acquisition has remained largely unchanged since the setting up of the Director General of Acquisition in the Ministry of Defence on the recommendations of the Group of Ministers report post-Kargil conflict.[11] The organisational structure occupies a high precedence in 'systems thinking' and this paper examines the acquisition structure reform options generated through the systems approach as applicable currently to the Indian scenario. Post 1930s, three different models of management—traditional approach, human relations theory and systems theory—competed for precedence. The traditional approach was based on Taylor's scientific theory, Fayol's administrative management theory and Weber's bureaucracy theory. It was in the 1960s that, because of the weaknesses of the traditional and human relationships models, and because of its own inherent superiority, that the systems approach came to dominate the management landscape. George Wilhelm Hegel (1770-1831) was the German philosopher who is credited with being a pioneer in 'systems' thinking and had propounded the following postulates:

- **The whole is more than the sum of the parts:** The system as a whole has an objective which may not be explained by the sum of the parts. The study of the parts alone will not explain the whole system.
- **The whole determines the nature of the parts:** The same part may

perform different roles in different systems.

- **The parts cannot be understood if considered in isolation from the whole:** the role played by the parts is determined by the whole.
- **The parts are dynamically inter-related and interdependent:** for understanding a system, it is important to understand and analyse such inter-relationships.

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The systems approach examines a discipline from the paradigm of interaction among its components rather than their individual output, with the most significant feature, that of the behaviour of a part or a component or a sub-system being entirely different from the behaviour of the system, as a whole. If this analogy is applied to the acquisition system, the purpose which the acquisition system as a whole is designed to fulfil i.e. *meeting the aspirations of the defence forces through timely procurement of weapons and equipment within the allocated budget* cannot be achieved individually by its components or sub-systems i.e. the planning sub-system, the budgetary sub-system, the procedural sub-system, the supply chain sub-system and the structural sub-system but can be fulfilled only through an ideal interaction among all these sub-systems.

Cause and Effect Relationship in Acquisitions: Causal loops are often used in the systems approach to solve complex problems under the systems dynamics approach. Eleven laws of systems theory propounded by Peter Senge, are applicable to all complex issues, including the acquisition system.[12] The connectedness / inter-relationship between

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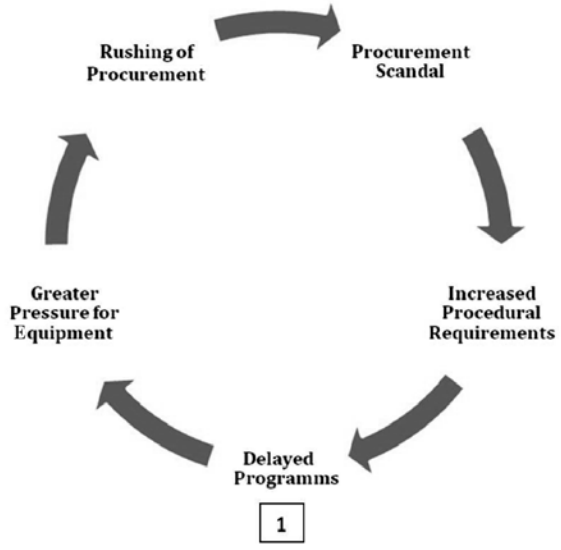
the various components of a system is fundamental to systems thinking. This connectedness is expressed by the Causal Loop Diagram (CLD) which is a visual depiction of a complex system. The causal loops typically evolve into system archetypes which depict a distinctive combination of reinforcing and balancing loops. One of the afflictions of 'procurement scams' that plagues the acquisition system in India has been expressed through a CLD and explained below through the system archetype 'Fixes that Fail'.

Fig 1: Acquisition Causal Loop

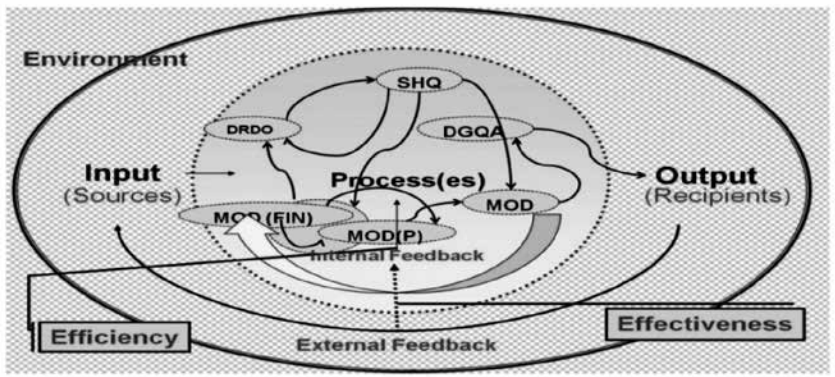


Fixes That Fail

Acquisition programmes in India are usually delayed (serial 1 refers) due to various reasons. The greater this delay, the greater the pressure on the acquisition system to procure equipment faster. The greater the pressure to procure, the greater the hurry and the acquisition system rushes for procurement. The greater the rush, the greater the chances of a procurement scam. The more the chances of a procurement scam, the greater are the short-term checks and balances introduced by the government in terms of probity and accountability, resulting in delayed programmes again. Hence, if we apply short-term "fixes" instead of actual long-term reforms, they are bound to be counter-productive.

Acquisitions as a System: The defence capital acquisition mechanism followed in India is not a process but a truly complex "system" conforming to the tenets of the systems theory. A system is defined as "*an identifiable, complex and dynamic element having an objective and is composed of discernible different elements or subsystems that are interrelated to, and interdependent on, each other; and the whole element has an overall capability to maintain stability and to adapt to behaviour in respect to external influence*". The acquisition system can, thus, be diagrammatically represented as under:

Fig 2: Acquisition System (a diagrammatic representation)



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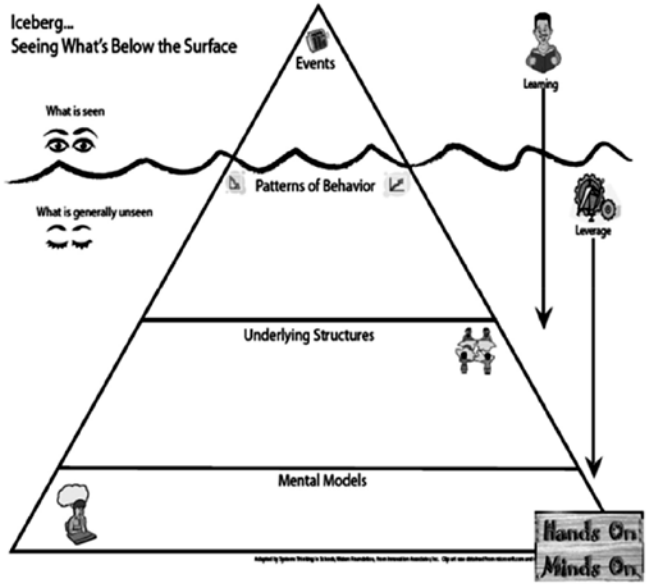
The acquisition organisation meets all the prerequisites of a system, i.e. it has well defined objectives, consists of sub-systems/ elements in the form of departments. These sub-systems are inter-related and inter-dependant. Any change in the elements or their relationships will result in a change in the system or its organisation as a whole. There is a flow of regular information in the organisation which takes feedback from the relevant departments and undergoes constant changes to achieve goals and objectives. The components of the acquisition system comprise the Service Headquarters (SHQ), Ministry of Defence (MoD), MoD (Production), MoD (Finance), Defence Research and Development Organisation (DRDO), Director General of Quality Assurance (DGQA), etc, and together they make the acquisition system work. There is a definitive system boundary and the corporate sector dealing with acquisition, end users as well as the other government departments such as the Department of Industrial Policy and Promotion (DIPP), etc which control the policies affecting acquisition, lie outside this boundary. Every system has a system ownership and these system owners are likely to be senior managers who can cause the system to change significantly or cease to exist. Stakeholding employees of the organisation or individuals with an operational role in the system, namely, the SHQ cannot be the system owner since it cannot change the system significantly. In the acquisition system, the system owners are the MoD, MoD (Production) and MoD (Finance) that wield the authority to control the system.

Process and Structures: A process such as the DPP is a transformation or a series of transformations brought about in the throughput of a system as a result of which the same transforms in shape, size, and version. Processes differ from structures in the sense

that they consist of states rather than elements and relations. A process is more dynamic in nature and gets easily influenced by the internal and external environments and the changes in the process, thus, are frequent. A structure, on the other hand, refers to a set of relations that have a positional value and is relatively stable in nature, having lasting components which either carry out processes or are acted upon by the processes. In keeping with the universal trend, the acquisition organisation too is structure-based where the presence of human beings fosters a resistance to change. The mismatch between structures and processes is responsible for a large number of systemic problems. Given the above dynamics, revising only the procedural aspects of the DPP year after year may result only in marginal improvements in the overall acquisition ecosystem. The performance of the acquisition system has not shown any dramatic improvements despite successive versions of the DPP because it is not being treated as a complex, multi-layered non-linear system which it actually is, and needs to be viewed as a whole which is much more than the sum of the parts.[13] The entire effort of the policy-makers is concentrated towards refining only the processes while the archaic organisational structure responsible for its execution remains unaddressed. Systems thinking professes that organisations usually react to events visible to them and make immediate changes to the processes in order to prevent a reccurrence. Reacting to events only brings about a transitory change. As per the tenets of systems thinking (Fig 3 below), the continuous patterns and trends which generate those events need to be anticipated and changes implemented accordingly, which again, will not be of a permanent nature. If a permanent change is desired, the structures on which these processes ride need to be addressed. Going beyond change, if the stakeholder seeks a transformation, mathematical models intended to capture the fundamental interactions between the system and its environment will need to be put in place and later validated to measure its performance.[14]

Fig 3: Tenets of Systems Thinking



Study of the acquisition Task Responsibility Matrix (TRM) in defence capital acquisition divulges a multiplicity of agencies with overlapping roles working towards the deployment of a military capability, making the entire process more inefficient and ineffective.[15] The process starts with the issue of the Raksha Mantri's Operational Directive (RMOD). The preparation of the Long-Term Integrated Perspective Plan (LTIPP) is the responsibility of the HQ Integrated Defence Staff (IDS) which is assigned to prepare the LTIPP, however, the MoD, MoD (Production) and MoD (Finance) remain in the consultative and informatory role, thereby, prolonging the cycle. Similarly, the Services Capital Acquisition Plan (SCAP), Annual Acquisition Plan (AAP) and Technology Perspective Capability Roadmap (TPCR) are finally compiled by the IDS while the MoD remains in the consultative and informatory role. Similarly, for Acceptance of Necessity (AoN) and categorisation cases, the MoD still

has an informatory and consultative role, without the accountability for the delay. A cursory glance at the various steps of the acquisition system reveals that the SHQ shoulders the responsibility for negotiating numerous steps while the authority lies with the MoD, MoD (Production) and MoD (Finance) that jointly own the acquisition system.

Examining the Acquisition System Through Soft Systems Methodology

The framework for classifying various methodologies for systems was developed by Jackson and Keys in 1984 and is referred to as the System of System Methodologies (SOSM). The participants are on X axis and the systems are on Y axis, as depicted in Table 1 below:

Table 1: Jackson and Keys Grid of Systems Theory

	UNITARY	PLURALIST	COERCIVE
SIMPLE	**Simple Unitary** – to include hard systems thinking, system dynamics, organisational cybernetics.	**Simple Pluralist** Soft system approaches.	**Simple Coercive** Emancipatory systems thinking and post-modern systems thinking.
COMPLEX	**Complex Unitary** Complexity theory.	**Complex Pluralist** Soft system approaches.	**Complex Coercive** Emancipatory systems thinking and post-modern systems thinking.

Simple systems are those having a few sub-systems that are involved in a small number of highly structured interactions. On the other hand, extremely complex systems have a large number of sub-systems that are involved in many more loosely structured interactions, the outcome of which is not predetermined. Unitary participants have similar values, beliefs and interests, and share a common purpose. The military set-up is a typical example of a unitary system. In a pluralist relationship,

although basic interests are compatible, they do not share common values and beliefs which is the case with the acquisition system. In coercive relationships, a few common interests exist and participants hold conflicting values and beliefs. No agreed objectives direct the actions of coercive participants. The hard systems thinking falls in the category of simple unitary where mathematical and analytical models can be made applicable. However, as the complexity increases or where a pre-defined goal cannot be stated, the approach would become inadequate. Moving down the axis increases the complexity of the system and the number of variables becomes large, with a greater number of interactions, making mathematical modelling impossible due to the dynamics of the system and the environment. In such cases, the system is analysed with the help of system dynamics. However, military systems are increasingly becoming complex human activity systems, hence, the Soft Systems Methodology (SSM, introduced by Peter Checkland in 1981) is required to be used to address them. The acquisition system falls in the category of a complex pluralist system. Each person's world view is a complex set of attitudes, beliefs, values, opinions and perceptions. In soft systems, the situation is perceived to exhibit crisis, conflict and uncertainty in relationships among the actors. SSM follows the undermentioned sequence:

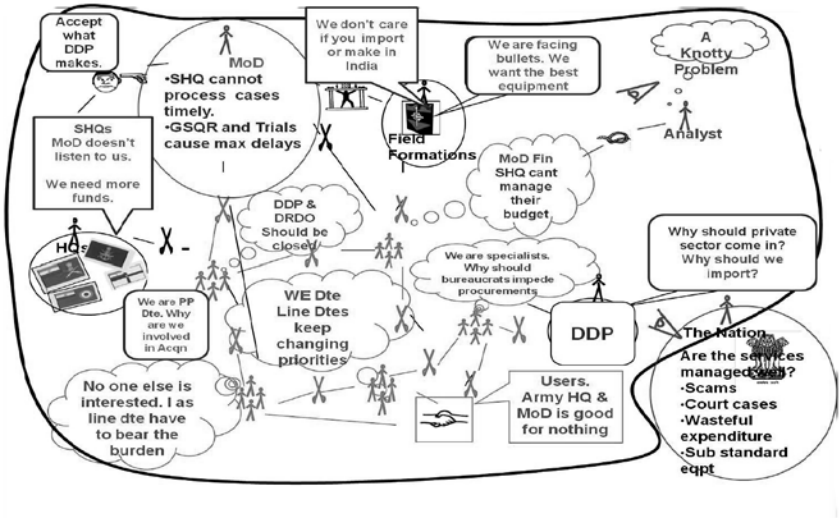
- The *first step* involves understanding and expression of the unstructured situation by analytical tools like the rich picture.
- *The second step* involves culling out of relevant systems and their root definitions from the rich picture. A relevant system is one which is thought to be helpful in learning about situations. The relevant systems can be both issue and primary task-based. The issue-based definitions are generally related to the mental process, whereas primary task-based ones are operationalised. The root definitions are expressed as '*a system to do X by Y in order to achieve Z.*'
- *The third step* involves evolving a conceptual model using the relevant systems and their root definitions. The conceptual model is based on

the desired transformation and includes monitoring and controlling elements. It also has design measures for the three criteria of efficacy, efficiency and effectiveness and, if required, ethics, as also gives out the hierarchy and connectedness of various activities.

- The *fourth step* involves comparing the activities of the conceptual models with the real life existing situations. Any changes implemented should be both systematically desirable and culturally feasible.

Rich Picture Analysis: Accordingly, in keeping with the tenets of SSM, a rich picture which has been constructed for the acquisition system, is examined, which gives the visual summary of the human activity system under discussion, i.e. the acquisition system. The rich picture has been obtained from various sources such as the personal experience of the author, memoranda of minutes, and stakeholders' interviews. The analyst should be able to draw out a number of primary and secondary tasks and issues which seem important to the situation and have been listed in Fig 4 below.

Fig 4: Rich Picture of Acquisition System



World Views of Stakeholders

- The SHQ believes that delays are caused at the MoD level and the bureaucracy is to blame for being unresponsive.
- End users want the best equipment and that too timely, whether it is 'Made in India' or ex import.
- The MoD believes that SHQ are not handling the priorities and budget correctly.
- The DDP resists private sector entry into the business of defence.

A two-fold analysis of the rich picture has been attempted to include both task-based and issue-based analysis. Task-based analysis of the rich picture depicts that, *firstly*, the primary task of the acquisition system is timely procurement within the approved budget; *secondly*, the aim of self-reliance in defence equipment needs to be accorded primacy; and *thirdly*, the aspect of probity and public accountability should be central to any procurement. The issue-based analysis explains the issues impacting acquisitions viz, *firstly,* the acquisition process is too long and time consuming; *secondly*, there are too many stakeholders and the organisation is too complex; *thirdly,* there is a perceptible lack of communication between the stakeholders; and, *fourthly*, there is a difference in opinion between the various stakeholders.

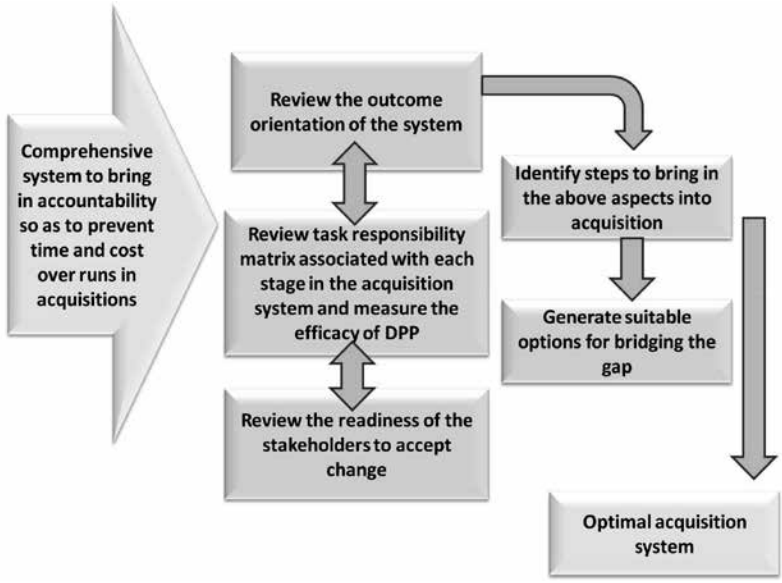
Relevant Systems (RS) and Root Definitions (RD): Relevant systems and their root definitions have been derived from the issue identified from the rich picture at this stage. A relevant system is one which is thought to be helpful in learning about situations. The relevant systems can be both issue and task-based and the core of any relevant system is the transformation it performs. The root definition should pass the CATWOE test which is a useful mnemonic for structuring root definition. Accordingly, the root definition for the acquisition system can be defined as an optimal acquisition system to ensure timely acquisition of weapons and equipment within the desired budget by realigning the structures and processes in the MoD, for meeting the aspirations of the end user.

CATWOE Test

- **Customers:** End users in Army units and formations
- **Actors:** MoD, MoD (Fin), DDP, senior officers in field formations, Deputy Chief of the Army Staff (DCOAS) (P&S) Directors General (DGs) of Line Directorates**,** DG WE (Weapons and Equipment), DG PP, Army and other (civil and tri-Service) training institutions and Personnel Below Officer Rank (PBOR).
- **Transformation:** From the existing system devoid of accountability for time and cost overruns to a system closely monitored through suitable structures and processes.
- **Worldview:** Lack of suitable organisational structures and accountability in the existing stakeholders results in acquisition time and cost overruns in acquisition.
- **Owner:** Ministry of Defence.
- **Environment:** Public and private sector, industry, Ministry of Commerce, Ministry of External Affairs.

Accordingly, a conceptual model for the acquisition system has been evolved which guides the analyst to the transformation desired in the system and has been shown in Fig 5 below.

Fig 5: Conceptual Model



Comparison of Existing and Desired Systems: In keeping with the sequence of SSM, Table 2 below gives out the comparison of various activities mandated by the conceptual models i.e. the process desired with that existing as on date. Such comparisons will generate ideas for change for further debate and implementation. In the case of the acquisition system under discussion, three main activities are evolved on examination of the conceptual model for improvement of the DPP, along with the aspects that need emphasis in the form of back-up activities and observations. Analysis reveals that these activities do not figure in the existing acquisition system or the real world as elaborated in the 'observation' column of Table 2 and, hence, are required to be added to the agenda. These activities need to be reengineered to enhance the output of the acquisition system as a whole.

Table 2: Comparison of Existing and Desired Processes

Main Activity	Back-up Activity	Present in Real World	Observations	Add to Agenda
Review the task responsibility matrix with each stage in acquisition process and gauge the efficacy of the process.	Has the DPP been successful in reducing import dependence?	No	India still remains the largest importer of arms in the world.[16]	Yes
	Is the DPP effective as a capability building document?	No	The DPP is largely a contract operating manual rather than a capability building document. The Services still remain devoid of critical capabilities.[17]	Yes
	Has the DPP been successful in achieving the desired capability in the mandated timelines?	No	Acquisition timelines are violated in most acquisition cases.	Yes

	Has the DPP been effective in establishing capability as per laid down QRs?	No	Flawed General Services Qualitative Requirements (GSQRs) are responsible for more than half of the cases being closed prior to delivery.[18] However, the capability being inducted finally conforms to the laid down QRs.	Yes
	Has the DPP been effective in ensuring a high standard of probity and transparency?	No	The acquisition system in India has been mired in a series of corruption cases in the recent past.[19]	Yes
	Have continuous revisions of the DPP led to improvements in capability development and self reliance.	No	The DPP has undergone nine revisions, however, no major capability enhancement has been seen as a result of these revisions while India still remains low in self-reliance in defence equipment.[20]	Yes

Review the outcome orientation of acquisition system.	Need for timely establishment of capability and its conflicts with other acquisition aims such as cost effectiveness, self-sufficiency, probity and competition.	No	Timely establishment of capability is often sacrificed in favour of propriety, probity, public accountability free competition and impartiality as laid down in the aim of the DPP.[21]	Yes
	Does the capability establishment have a defined ownership under the existing acquisition system?	No	There is no single owner of a particular acquisition case.	Yes
	Does the acquisition system facilitate adequate monitoring and coordination between various stakeholders for capability establishment and its effect on self-reliance of defence needs?	No	There is a lack of coordination between various stakeholders despite the agreement on the overall aim of achieving a capability.[22]	Yes

	Does the acquisition system mandate application of programme management towards achieving of an acquisition outcome?	No	Presently, no significant project management techniques are being carried out in the field of acquisition, hence, its benefits are not clearly known to the environment.	Yes
	Does the acquisition system hedge against the level and role of the strategic leadership?	No	The role of the strategic apex such as the DAC needs to be studied to determine the quality of decisions given by it.	Yes
	Does the acquisition system promote and foster processes and structures to build in inherent accountability?	No	Programme management needs to be built in to bring in accountability.	Yes
	Does the system promote a need for joint perspective planning?	No	The Services, DRDO, and the industry need to plan jointly to achieve the aim of self-reliance in defence.[23]	Yes

Review the readiness of stakeholders to accept change	Is there a congruence of views among stakeholders towards timely establishment of military capability?	No	There is incongruence of worldviews within stakeholders towards timely acquisition of a capability.	Yes
	Is achievement of the desired outcome considered more important than achieving functional excellence in the individual sphere of stakeholders?	No	Presently, the emphasis is on coordinating functional aspects rather than systemic excellence and the focus is output-based rather than outcome-based.	Yes
	Is there adequate effort to reduce the long-winded procedures in order to achieve timely establishment of capability?	No	The present DPP consists of evaluations by multiple committees which are open-ended, causing delays; as a result, it is very difficult to build in the required accountability into the system.	Yes

	Is the appraisal system effective enough to facilitate the achievement of both functional and systemic excellence?	No	The appraisal system needs to be so designed that the functionary is able to operate in a matrix organisation and report to both the functional as well as the programme head.[24]	Yes
	Are adequate efforts being made to ensure infusion of best IT and programme management practices to ensure goals of defence procurement?	No	Advanced Armies have implemented best IT and PM practices which the Indian system is still devoid of.[25]	Yes
	Are there adequate efforts to determine the role of leadership towards driving acquisition programmes at all levels?	No	The leadership needs to drive the programmes aggressively for timely acquisition of a capability.	Yes

Stakeholders Views Through Primary Research

The deductions arrived at through the systems approach have been discussed in Table 2 above after which primary research has also been undertaken by the author in order to substantiate these deductions. The sampling frame for the research consisted of 131 serving military and civilian officers dealing with acquisition in various capacities in

the SHQ, MoD and DRDO as also officers of the National Defence College (NDC) course representing the users. Inputs were also sought from members of the corporate sector entities dealing in defence acquisition. A survey instrument based on the major issues flagged by the conceptual model was designed and responses sought from the various stakeholders, as outlined above. The first aspect was devoted to measuring the attitudes of the stakeholders towards the popular perception that a *process* revision, i.e. a revision of the DPP will give an outcome orientation to the acquisition system. The responses were sought on a scale of 1 to 5, with three being neutral, and 1 and 5 being strongly 'disagree' and 'strongly agree' respectively. Here the mean responses of all 131 respondents were neutral at 2.93 i.e. the respondents were not sure of achieving the outcome orientation through improvement in the DPP alone. The next aspect was devoted to measuring the felt need for a management *structure* that has a project and outcome orientation. The mean response arrived at was at 3.72, indicating strong agreement that there is a need for a structure that can support project and outcome orientation to the defence acquisition process. The last aspect was targeted to measure the *readiness to change* among the respondents. The mean response was at 4.03 which indicated strong agreement in support of change.

The survey results conclusively substantiate the findings of the systems approach and indicate strong agreement among the target population towards realigning structures for project and outcome orientation. The structural changes being sought are in terms of a lean and agile programme-based, fully accountable acquisition organisation. The existing procurement organisation consists of three specialist verticals of *acquisition, production* and *technology* where the flow of the specialist functional authority is presently top down. A lateral integration of the specialist authority through an additional programme vertical is proposed to ensure that best

practices in that specialist vertical are mandated through orders and guidelines to achieve the outcome desired as part of a specialist contribution to the project e.g. procurement, production and quality assurance, to name a few. Establishment of such lateral linkages at the operational level would convert it into an effective matrix organisation.[26]

Conclusion

The sub-optimal output generated by the capital acquisition system in India does not stem from a lack of any new category or an impeded industry capability. The stakeholder's incongruence resulting from a silo-based acquisition structure deployed to execute the policy has itself been significantly responsible for decapitating the system. In the absence of enabling structures, the DPP 2016, in its new albeit finite avataar of largely being a contract operating manual, may not be able to fulfil the outcome expected of it. The DPP represents the internal lead time of the MoD towards the award of a contract, and the laid down timelines can only be adhered to if the structures are redefined to promote dynamic processes. A legislative solution on the lines of the Goldwater-Nichols United States Department of Defence Reorganisation Act of 1986 needs to be tabled to implement meaningful structural reforms facilitating lateral integration as mandated by the 'systems' thinking.[27]

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25. Committee of Experts for Amendment to DPP-2013, including formulation of policy framework, available at http://www.mod.nic.in/ writereaddata/ Reportddp.pdf
26. Research evidence suggests that an organisation that employs 3,000 employees is likely to have seven levels in its hierarchy and is a tall organisation. Unduly tall organisations suffer from major communication and motivation problems.
27. The Goldwater–Nichols Department of Defence Reorganisation Act of 1986 Pub.L. 99–433 signed by Ronald Reagan, made the most sweeping changes to the United States Department of Defence since the department was established by the National Security Act of 1947, by reworking the command structure of the United States military.