National Policy Passport to MSMEs Sustainability in Warship Building towards Aatmanirbhar Bharat

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Abstract

The Defence procurement and Defence acquisition policies are totally aimed at achieving self-reliance through indigenisation efforts keeping in view the much needed boost to the MSMEs, towards Aatmanirbhar Bharat. The Ministry of Defence has promulgated Defence Acquisition Procedure document titled DAP 2020, which inter alia details exhaustive procedures to be followed for Defence Ship Building and the stringent compliance of exacting standards that are to be implicitly adhered to by the shipyards. The Micro, Small and Medium Enterprises have evolved into a major contributor to the national economy in multifarious sectors of operations. MSMEs can play a vital part in supplementing and complementing large industrial houses and dovetailing them will provide the requisite synergy and capitalization of efforts towards Aatmanirbhar Bharat.

This paper examines various aspects of National Policy and Sustainability and evolve measurement indicators towards involvement of MSMEs in warship building.

Key words

Warship building, MSMEs, National Policy, Sustainability, Aatmanirbhar Bharat, Measurement indicators, Cronbach alpha, canonical correlation ,Wilks Statistic

I.   Introduction

1.1 The warship building programmes is totally dictated by the national policy on Maritime interests of India and the projection of a Maritime power of the country. A Maritime Capability Perspective Plan (MCPP) has been drawn envisaging a 200 strong combat fleet by 2027.The present Maritime Capability Perspective Plan (MCPP) covers 15 years period up to the XIV Plan i.e., till 2027. MCPP is based on a capability dominant and threat cum mission based approach,' which is driven by national interests. In consonance with this perspective plan, " Indian Naval Indigenisation Plan(INIP) 2015-2030" has been drawn. "The INIP 2015-2030 document is aimed to enable indigenous development of equipment and systems over the next 15 years. It attempts to formulate the requirements of the Indian Navy and lists out the equipment which can be taken up for indigenisation in the coming years. It is expected that release of this plan would further synergise Indian Navy's relationship with the industry and encourage all sectors of industry to come forward and participate in indigenous development of weapons, sensors, and other high end equipment for the Indian Navy, thereby making the nation self-reliant in this vital domain of Defence technology."

1.2 MSMEs , the backbone of any nation, must meet highest standards of Technology dictated in warship building, with Research & Development as a continuum in order to keep the combat systems abreast of the technology meeting the exacting operational requirements. This indeed is a major challenge for MSMEs to be engaged in warship building. This paper examines various aspects of National Policy and evolve indicators for ensuring National Policy for the MSMEs to be involved and remain sustainable.

II Literature Review

2.1 The Annual Report 2022-2023 of MSMEs cites that

"National policy is given adequate impetus and thrust on technology upgradation with focus on implementing new age technology through better awareness, adopting best practices, developing indigenous technology as well as collaboration with global partners, Create an environment for MSME joint ventures for Indian MSMEs to partner with their global businesses and evolve to global levels of innovation adapting to new technologies and attention to quality and Develop a focused institution encouraging technology development and R&D activities in MSMEs in a coordinated manner. MSME Ministry with the World bank assistance is implementing Technology Centre Systems Programme (TCSP) to establish new tool rooms and Technology Development Centres and upgrading existing centres to bring MSMEs onboard to digital platform" (MSME Ministry, 2022-2023).

2.2 In the Union Budget (2022-23),

"Allocation to the Defence Research and Development Organization (DRDO) has been enhanced by 9 percent, with a total allocation of Rs 23,264 crores. The defence budget has also focused on a technology development fund. "The MoD has specified its funding for the Innovations for Defence Excellence (iDEX) and the Defence Testing Infrastructure Scheme (DTIS) which is Rs 116 crore and Rs 45 crore respectively, representing an enhancement of 93 percent for iDEX and 95 percent for DTIS over 2022-23. Also, the government had announced an allocation of 25 percent of the defence R&D budget to Industry, startups and academia in the 2022-23 budget."

III Research Methodology

3.1 The aim of the study is to establish and confirm the relationship between National Policy necessitated in warship building by MSMEs and their Sustainability.

3.2 Variables and Measurement

National Policy is an unobserved latent variable also called construct. Since it is multi-dimensional in nature, eight measured indicators have been used to measure the National Policy in warship building. Balachandran and Aanand (2023) have formulated the eight measurement indicators for the National Policy as:-

1. Ease of Registration of MSMEs (NP1)

2. Adoption of modern Technology with cost element (NP2)

3. Infrastructure development of MSMEs with cost factor (NP3)

4. Promoting competitiveness of MSMEs about cost factor(NP4)

5. Conduciveness towards cost of Procurement of product for warship building(NP5)

6. Promoting "Research & Development" taking cost factors into account (NP6)

7. Helpfulness In collaborative efforts with Public Sector Undertakings(NP7)

8. Catering to marketing & distribution platforms (NP8)

Independent variable   - National Policy

Dependent variable   - Sustainability

Sustainability is an outcome variable and multi-dimensional in nature. The measured indicators of Sustainability are as follow :-

1. Does your company have a formal sustainability programme?
2. Does your product meet International standards?
3. What percentage of Business work is conducted Internationally?
4. To what extent Global Economy affected business you are engaged in?
5. Our company utilise the Credit Linked Capital Subsidy Scheme (CLCSS) instituted by the Government of India providing upfront capital subsidy for Technology upgradation.
6. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Entrepreneurial and Managerial development.
7. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Intellectual Property Rights (IPR).
8. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Design Expertise in manufacturing sector.
9. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on providing marketing assistance.
10. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Technology upgradation and Quality upgradation support.
11. Our company utilise the ISO 9000/ ISO 14001 certification reimbursement scheme provided by the Government of India under the National Competitiveness Manufacturing Programme (NMCP).

3.3 Hypothesis

H_0: There is no correlation between National Policy and Sustainability in warship building (R=0)

H_1: There is a significant relationship between National Policy and Sustainability in warship building (R$\neq$ 0)

Level of significance for testing hypothesis α =.05

3.4 Data analysis

3.4.1 In order to establish reliability and validity of measurement indicators, a pilot study was undertaken by farming out the questionnaires to the MSMEs registered with the shipyards PAN India. Cronbach Alpha and Average Variance Extracted (AVE) were determined to establish reliability and validity of measurements respectively.

3.4.2 Reliability Tests

Statistical results on reliability tests conducted with pilot data (N = 70) are appended.

Reliability

Scale: NP

Case Processing Summary

		N	%
Cases	Valid	70	100.0
	Excluded[a]	0	.0
	Total	70	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.858	8

Reliability

Scale: SBL

Case Processing Summary

		N	%
Cases	Valid	70	100.0
	Excluded[a]	0	.0
	Total	70	100.0

Reliability Statistics

| Cronbach's Alpha	N of Items
.953	10

Cronbach Alpha of .858 was achieved for National Policy (NP) and 0.953 for Sustainability (SBL) and all measurements are positively contributing. ; alpha value ranges between 0 and 1; the threshold being 0.7 and above (Nunelly,1994). As Cronbach Alpha is more than 0.7, reliability of measurement indicators of national Policy and sustainability has been established.

3.4.3 Validity

The minimum acceptable value of AVE is 0.5 because value of 0.5 and above means that the construct explains more than half of the variance of its measurement indicators. (Hair et al., 2014). Statistical results on validity tests conducted with pilot data (N = 70) are appended.

Factor Loading – National Policy
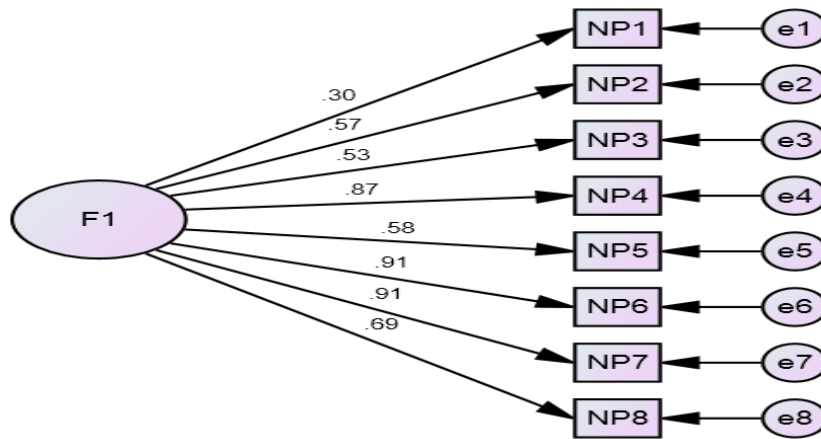
Measured Indicators	Path	construct	FL	FL squared	AVE	AVE after deletion of weak indicator
NP1	<---	F1	0.296	0.087616		
NP2	<---	F1	0.573	0.328329		
NP3	<---	F1	0.533	0.284089		
NP4	<---	F1	0.868	0.753424	0.49	0.547
NP5	<---	F1	0.579	0.335241		
NP6	<---	F1	0.911	0.829921		
NP7	<---	F1	0.907	0.822649		
NP8	<---	F1	0.692	0.478864		
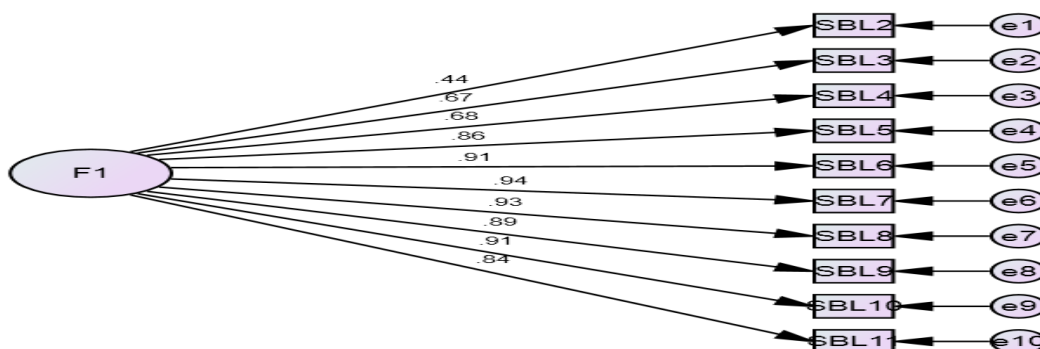
measured indicators		Construct	FL	FL squared	AVE
SBL2	<---	F1	0.442	0.195364	
SBL3	<---	F1	0.667	0.444889	
SBL4	<---	F1	0.683	0.466489	
SBL5	<---	F1	0.863	0.744769	
SBL6	<---	F1	0.908	0.824464	
SBL7	<---	F1	0.94	0.8836	0.675
SBL8	<---	F1	0.927	0.859329	
SBL9	<---	F1	0.892	0.795664	
SBL10	<---	F1	0.91	0.8281	
SBL11	<---	F1	0.842	0.708964	

Factor loading of less than 0.5 is considered as a weak indicator. Average Variance Extracted was found to be 0.547 for national Policy construct, after removal of the weak indicator and 0.675 for Sustainability construct, both well above the threshold of 0.5, proving the validity of the measurements. Having found that the measurement indicators evolved are reliable and valid, 160 responses from MSMEs were collated and statistically analysed by canonical correlations.

3.4.4 Canonical Correlations

Canonical Correlation Analysis (CCA) is a multivariate statistical technique used to identify and measure the relationship between two sets of variables by finding linear combinations of variables from each set that are correlated with each other maximally. By Canonical Correlation Analysis, the canonical correlation coefficients are found out. The correlation coefficients reflect the strength of the association between the linear combinations of variables in the two datasets. The value of canonical correlation coefficients ranges from 0 (indicating no correlation) to 1 (indicating perfect correlation). CCA is used to answer questions such as: How are two sets of variables related to each other? What variables are most important in predicting outcomes in one dataset based on variables in the other dataset?

3.4.4.1 Canonical Correlations Test Results

Canonical Correlations
[DataSet1]

Canonical Correlations Settings

	Values
Set 1 Variables	NP1 NP2 NP3 NP4 NP5 NP6 NP7 NP8

Set 2 Variables	SBL2 SBL3 SBL4 SBL5 SBL6 SBL7 SBL8 SBL9 SBL10 SBL11
Centered Dataset	None
Scoring Syntax	None
Correlations Used for Scoring	8

Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	.714	1.039	.160	3.433	80.000	820.399	<.001
2	.592	.539	.327	2.556	63.000	732.643	<.001
3	.466	.277	.503	2.012	48.000	643.717	<.001
4	.428	.224	.642	1.758	35.000	553.497	.005
5	.361	.149	.786	1.375	24.000	461.703	.112
6	.236	.059	.903	.919	15.000	367.556	.543
7	.193	.039	.957	.750	8.000	268.000	.648
8	.078	.006	.994	.278	3.000	135.000	.841

H0 for Wilks test is that the correlations in the current and following rows are zero

Set 1 Standardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8
NP1	-.263	-.293	-.673	-.612	-.544	-.305	.010	-.490
NP2	-.331	.499	.776	-.295	-.770	-.051	-.350	.432
NP3	-.010	-.652	-.078	-.187	.636	.615	.740	.933
NP4	.238	.186	.034	.473	-.996	.459	.900	-.551
NP5	-.302	-.740	.342	.540	.076	-.879	-.688	-.012
NP6	-.325	.246	-.011	-.825	.900	-.481	.519	-1.202
NP7	-.319	.025	-.318	-.062	.077	1.222	-.830	-.251
NP8	1.403	-.170	.453	.341	.061	-.514	-.510	.652

Set 2 Standardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8
SBL2	-.411	.030	-.036	-.307	-.127	-.789	.184	-.208
SBL3	-.469	-.536	-.170	.103	.185	.303	.101	-.180
SBL4	.186	.558	.517	.042	.085	.039	-.049	-.429
SBL5	-.048	.290	-.252	-.413	.681	-.511	-.225	-.059
SBL6	.478	-.373	.277	.997	-.952	-.563	-.384	-.667
SBL7	.454	-.145	-.508	-1.036	.032	.235	1.081	.377
SBL8	.123	-.289	.592	1.091	1.147	-.174	.026	.545
SBL9	-.423	.186	.619	-.323	-.575	-.012	-.319	.726

SBL10	-.113	-.097	-.227	-1.222	.260	.526	-.308	-.918
SBL11	-.026	-.049	-.169	.316	-.188	-.102	-.681	.409

Set 1 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8
NP1	-.317	-.353	-.811	-.738	-.655	-.367	.012	-.590
NP2	-.443	.666	1.037	-.394	-1.028	-.069	-.467	.577
NP3	-.011	-.730	-.087	-.209	.711	.688	.827	1.044
NP4	.275	.215	.039	.548	-1.152	.531	1.041	-.637
NP5	-.291	-.714	.330	.521	.073	-.848	-.664	-.012
NP6	-.305	.230	-.011	-.773	.843	-.451	.486	-1.126
NP7	-.294	.023	-.294	-.057	.071	1.128	-.766	-.231
NP8	1.192	-.145	.385	.290	.052	-.436	-.434	.554

Set 2 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8
SBL2	-.496	.036	-.043	-.371	-.153	-.953	.222	-.252
SBL3	-.519	-.593	-.188	.114	.205	.335	.112	-.199
SBL4	.222	.668	.619	.051	.102	.047	-.059	-.513
SBL5	-.056	.336	-.292	-.479	.789	-.592	-.261	-.068
SBL6	.593	-.462	.343	1.236	-1.180	-.698	-.476	-.827
SBL7	.582	-.186	-.652	-1.329	.041	.301	1.387	.483
SBL8	.145	-.341	.698	1.286	1.352	-.205	.031	.643
SBL9	-.644	.282	.941	-.492	-.875	-.018	-.485	1.104
SBL10	-.129	-.110	-.257	-1.385	.295	.597	-.349	-1.041
SBL11	-.029	-.054	-.185	.347	-.206	-.112	-.747	.448

Set 1 Canonical Loadings

Variable	1	2	3	4	5	6	7	8
NP1	.166	-.509	-.306	-.624	-.456	-.100	-.088	-.058
NP2	-.115	-.121	.747	-.540	-.315	.125	-.068	.055
NP3	.028	-.709	.416	-.386	.020	.308	.260	.112
NP4	.210	-.452	.496	.088	-.325	.314	.281	-.463
NP5	-.217	-.744	.513	.179	-.048	-.036	-.118	-.294
NP6	.171	-.288	.613	-.440	.200	.120	.072	-.508
NP7	.153	-.411	.323	-.220	.000	.595	-.391	-.385
NP8	.710	-.373	.364	-.376	-.069	.115	-.176	-.187

Set 2 Canonical Loadings

Variable	1	2	3	4	5	6	7	8
SBL2	-.513	-.177	.243	-.087	-.095	-.628	.295	-.173
SBL3	-.537	-.499	.049	.009	.078	.214	-.056	-.249
SBL4	.094	.416	.586	-.045	.033	.159	-.056	-.383
SBL5	.268	.099	-.279	-.291	.392	-.443	-.415	.048
SBL6	.543	-.597	.287	-.165	-.146	-.324	-.220	-.166
SBL7	.583	-.517	.253	-.429	-.018	-.142	.078	.164
SBL8	.268	-.591	.597	-.101	.379	-.176	-.052	.128
SBL9	-.019	-.333	.667	-.459	-.133	-.086	-.240	.335
SBL10	.245	-.577	.406	-.462	.147	.045	-.359	-.199
SBL11	.214	-.274	-.112	-.091	-.083	-.032	-.735	.220

Set 1 Cross Loadings

Variable	1	2	3	4	5	6	7	8
NP1	.119	-.301	-.142	-.267	-.165	-.024	-.017	-.005
NP2	-.082	-.072	.348	-.231	-.114	.029	-.013	.004
NP3	.020	-.419	.194	-.165	.007	.073	.050	.009
NP4	.150	-.268	.231	.038	-.117	.074	.054	-.036
NP5	-.155	-.440	.239	.077	-.017	-.008	-.023	-.023
NP6	.122	-.171	.286	-.188	.072	.028	.014	-.040
NP7	.110	-.243	.151	-.094	.000	.141	-.076	-.030
NP8	.506	-.221	.170	-.161	-.025	.027	-.034	-.015

Set 2 Cross Loadings

Variable	1	2	3	4	5	6	7	8
SBL2	-.366	-.105	.113	-.037	-.034	-.148	.057	-.014
SBL3	-.384	-.295	.023	.004	.028	.050	-.011	-.019
SBL4	.067	.246	.273	-.019	.012	.037	-.011	-.030
SBL5	.192	.059	-.130	-.125	.141	-.105	-.080	.004
SBL6	.388	-.353	.134	-.071	-.053	-.076	-.043	-.013
SBL7	.416	-.306	.118	-.184	-.007	-.033	.015	.013
SBL8	.192	-.350	.278	-.043	.137	-.042	-.010	.010
SBL9	-.014	-.197	.311	-.197	-.048	-.020	-.046	.026
SBL10	.175	-.341	.189	-.198	.053	.011	-.069	-.016
SBL11	.153	-.162	-.052	-.039	-.030	-.007	-.142	.017

Proportion of Variance Explained

Canonical Variable	Set 1 by Self	Set 1 by Set 2	Set 2 by Self	Set 2 by Set 1
1	.086	.044	.145	.074
2	.241	.084	.196	.068
3	.243	.053	.161	.035
4	.157	.029	.075	.014
5	.058	.007	.038	.005
6	.075	.004	.083	.005

7	.045	.002	.105	.004
8	.095	.001	.051	.000

Canonical correlation results show a strong and significant relationship exist between National Policy and Sustainability (r = 0.714, p <.001).

IV. Inference

4. The following inferences are drawn, meeting the Research objectives:-

(a) As F test value of $F_{(80,820)}$ being 3.433 and p value is less than 0.001 well below .05, it is concluded that there is a significant relationship between National Policy and Sustainability in warship building by MSMEs to achieve Aatmanirbhar Bharat.

(b) A direct strong relationship between variables National Policy and Sustainability is indicated; value of R being 0.714. In other words, if National Policy is enforced substantially, MSMEs involvement in warship building will also be enhanced and Sustainability will also move upwards.

(c) Wilks statistics shows 0.16. Hence, the unexplained variation is around 16 %, which indicates that there is much more explained variance compared to unexplained variance.

(d) A strong significant relationship exists between National Policy and Sustainability.

V. Conclusion

5..Evolving reliable and valid measurement indicators for the National Policy that ought to be ensured by the MSMEs and their Sustainability in turn is a unique study by itself.. The measurements reveal that the National Policy indicators evolved and statistically tested supports the MSMEs in warship building ensuring their sustainability. The number of MSMEs participating in the warship building programme is rather limited compared to a mammoth number of MSMEs sprawled across the country. The National Policy indicators certainly would help the Government agencies and the MSMEs alike to promote highest quality standards, with a view to have a larger participation in the warship building programme. The Public sector undertakings and the large industrial houses should collaborate with the MSMEs to achieve the exacting technology standards by the MSMEs and the transfer of technology by the R & D organisations of the Government should be continuously perpetuated to the MSMEs to actively partake in the warship building programme.

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