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Technological Excellence crucial for MSMEs in Warship Building towards

AATMANIRBHAR BHARAT

Rear Admiral V Balachandran AVSM NM VSM (Retd)

(Research Scholar - Sri Balaji University, Pune)

Dr Shubhra Aanand

(Professor - Sri Balaji University, Pune)

Abstract

Technology plays pivotal role in any industry and the ability to promote the technology as a continuum abreast of latest developments universally dictates the sustainability of the industry. MSMEs are no exception to this dictum and for MSMEs to keep floating in the technological domain dictates its sustainability in Warship building. Warship being a complex platform packed with a variety of weapons and sensors ought to operate in exacting conditions meeting its operational role intended. The systems mandatorily be updated as a continuum by continuous Research to develop state of art systems. Research & development ought to be in the areas right from high quality materials that are to be used in warship building to designing complex command and control systems ; technologically intensive and operationally flexible. MSMEs , the backbone of any nation, must be continuously abreast of modern technology with continuous research inputs to stay ahead in warship building programme and sustain themselves. This paper examines various aspects of Technology & Research & Development and evolve indicators for ensuring Technology & Research & Development for the MSMEs to be involved in warship building and remain sustainable.

Key words

Warship building, MSMEs, Technology & Research & Development, Sustainability, Aatmanirbhar Bharat, Measurement indicators, Cronbach alpha, canonical correlation ,Wilks Statistic

I. Introduction

1.1 The Indian Navy has sailed miles ahead from the buyer's navy to builder's navy in 70's and there is no looking back , with orders overflowing in the shipyards for indigenous warship building. The latest building and commissioning of aircraft carrier INS Vikrant has ushered a new dimension in warship building, showcasing India's technical prowess, competence and capability in achieving self-reliance in this vital area. Technology plays pivotal role in any industry and the ability to promote the technology as a continuum abreast of latest developments universally dictates the sustainability of the industry. MSMEs are no exception to this dictum and for MSMEs to keep floating in the technological domain dictates its sustainability in Warship building. Warship being a complex platform packed with a variety of weapons and sensors ought to operate in exacting conditions meeting its operational role intended. The systems mandatorily be updated as a continuum by continuous Research to develop state of art systems. Research & development ought to be in the areas right from high quality materials that are to be used in warship building to designing complex command and control systems ; technologically intensive and operationally flexible.

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 Technology & Research & Development and evolve indicators for ensuring Technology & Research & Development for the MSMEs to be involved and remain sustainable.

II Literature Review

2. Technology & Research & Development

2.1 "Self- reliance in defence manufacturing continues to be an important pillar of India's strategic autonomy. In line with the Government's 'Make in India' programme, several initiatives have been taken in the recent years to

build a robust defence industrial ecosystem capable of meeting existing and future requirements of the Armed Forces. The emerging dynamism of the Indian industry needs to be gainfully utilised to build domestic capabilities for designing, developing and manufacturing state of the art defence equipment. R&D and innovation remain important cornerstones of India's defence production strategy. With the launch of 'Start-Up India' programme, India has become the hotspot of start-up activity in the world, having the third-largest start-up ecosystem globally. These strengths need to be leveraged to catapult India to next level of frontier defence technologies, both for domestic use as also to foster exports".

2.2 (**Zamora, 2010**) has propounded a "Management of Technology (MOT) framework. MOT is defined as the application of science, engineering and managerial knowledge for the effective identification, selection, acquisition, development, exploitation, and protection of technologies appropriate for the production and delivery of goods and services necessary for the organization to gain competitive advantage and attain desired levels of growth and performance. The author has argued that for MSME Success and Sustainability Success will favour those firms who will learn to manage technology properly. The most likely to survive are - those who correctly recognize the needs of the market and develop product or process technologies that address such needs; those who can perform a proficient technology foresight or forecast and direct resources to such technological path; those who can devote resources to R&D and use them efficiently and effectively; those who can conduct technology intelligence and have the information for faster dissemination than their competitors; those who can build on and perform incremental innovations to existing products or processes in order to exploit unrecognized demand and deliver products to the market before obsolescence and competitors set in; and those who can take advantage of the resources offered by the government, industry and academe, mainly through collaboration"

2.3 (Singh P.2014) enunciated that "most of MSMEs in India lacks in their technological infrastructure and are technically backward and the imminent need for technology development in MSMEs and devise approaches for sustainable growth".

2.4 (**Technology, 2014**) Indian National innovation survey 2014 cites "cost of innovation, access to knowledge, infrastructure, market related constraints and government policy constraints as the key challenges for innovation to foster among the MSMEs in India. This survey of a sample of 900 firms, found that 865 of the innovation firms were small, privately owned and had innovations in the category of "new to the firm" with the main forms of innovations being 'acquisition of machinery"

2. 5 (**Govil, M , 2017)** "Indian SMEs have not been able to grow enough in terms of fostering R&D-driven innovation". Innovation is driven by various contributory factors such as knowledge factors , market factors, infrastructure factor, internal factors and Government policies and mechanisms. Resources are lacking for MSMEs towards in-house R&D warranting large industrial houses and the Government to step towards research in developing new products.

2.6 (**Raghuvanshi J , 2017)** Knowledge management emerged as the strongest enabler followed by Institutional support, idea management and technology management. "Organisational structure and involvement of the actors (customers and suppliers) has limited importance among all the other enablers because of the weak driving power

but high dependence on the other factors in the context of MSMEs. ISM-based model for enablers of innovation in MSMEs has been evolved".

2.7 (Sonia Mukherjee,2018) highlighted that "low technological levels reduces the potential of MSMEs, lower the demand for the product(lower sales) and lower profit margins. Higher investment in Technology and Research & Development and higher usage of digital and technology enabled platform is of paramount importance for Indian MSMEs to maintain competitiveness in the global markets".

2. 8 (**Defence, 2020**) In order to promote development of advanced state of art technologies to meet the exacting defence requirements, a "Technology development Scheme funded by the Government, as enunciated in the DPP 2020 was constituted, providing the much needed fillip to the MSMEs. This will enhance cutting edge technology capability for Defence application through leveraging the domestic capabilities available with Indian Industries especially MSMEs including Start-ups and provide them funding through grants for development of defence and dual use technologies that are currently not available with the Indian defence industry or have not been developed so far. To extend its benefits to defence design, development and manufacturing, it is intended to create an ecosystem which fosters innovation and encourages technology development in Defence. "Defence is by far, one of the most complex enterprises. Innovation in defence therefore necessitates elaborate support and effective nurturing. The objective therefore is to use a multi-pronged approach and reach out/engage a large pool of innovators/technocrats/professionals/academicians including amongst the smaller enterprises, startups and MSMES, to foster innovation in a coherent, strategized, and integrated manner. This would be achieved through the procedures:- Innovations for Defence Excellence (iDEX) and 'Open Competition' approach. Projects of Start-ups, MSMEs etc. with low capital investments and high innovation would be supported through grants and pursued under the iDEX category".

2.9 (**Beureau, 2021)** "Digital Saksham -an initiative led by the CII, Digital Saksham embarks on the beginning of a digital adoption movement. The goal is to strengthen over three lakh MSMEs through digital adoption, improved business skills and financial inclusion, thus strengthening their competitiveness through digital know-how and acceptance".

2.10 Confederation of Indian Industry (CII) announced a strategic MoU with National Institute for Micro, Small & Medium Enterprises (ni-msme) an organisation of Ministry of MSME, Government of India to launch the Digital Saksham Initiative - an expansive program designed to strengthen the competitiveness of MSMEs through digital know-how and acceptance. According to CII "This collaboration aims to educate and train micro and small business owners and entrepreneurs enabling them to integrate into the digital economy and access credit, expand their market access, diversify their customer base, digitize their financial operations and solidify their supply chain. The ultimate objective is to unlock the full potential of MSMEs in India, measured by greater profitability and financial resilience."

2.11 (Rajnath Singh, 2021) "**Amid changes in technology and increasing global security concerns, it is imperative the Indian defence industry focus on modernisation of the military and look at niche technologies.** Changes are being seen in every field and there is a great need for research and development in

futuristic defence technologies. Amid changes in technology and increasing global security concerns, it is imperative that the Indian defence industry focus on modernisation of the military and look at niche technologies, Different labs of the Defence Research and Development Organisation (DRDO) are working on technology in areas such as quantum computing, artificial intelligence and nanotechnology. Today there is also a need to develop dual use technologies, so that both military and civil can benefit from it on a large scale. To provide state of the art equipment to our Armed Forces, special focus will be on research and development. Today, as there is talk of technology transfer from DRDO to industry, in the coming times, efforts should be made that our industry does not need it." The minister also called for increased participation of the private sector in the defence industry. Historically, Singh mentioned, we see the presence of private sector in the Indian defence industry was very low. He cited the availability of capital and technology, long gestation period as some of the reasons".

2.12 (MSME M. o., 2022 - 2023) "The National policy has 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".

2.13 (Finance, 2023) "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 crore in 2023-24. 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 Purpose of the study is to establish and confirm the relationship between Technology & Research & Development necessitated in warship building by MSMEs and their Sustainability.

3.2 Variables and Measurement

Technology & Research & Development is an unobserved latent variable also called construct. Since it is multi-dimensional in nature, seven measured indicators have been used to measure the Technology & Research & Development in warship building. List of these indicators is as follows :-

1. Our company is abreast of technology pertaining to our field of operation in warship building

2. Government support to my company in upgrading Technology pertaining to our field of operation in warship building
3. PSUs support to my company in upgrading Technology pertaining to our field of operation in warship building
4. Our company has Foreign collaboration in transfer of Technology pertaining to our field of operation in warship building
5. Our company is adopting IT centric Platforms pertaining to our field of operation in warship building
6. Our company incorporates Knowledge Management in our field of operation in warship building
7. Our company allocates adequate budget for Research & Development to keep abreast of technology pertaining to our field of operation in warship building
8. Our company has Collaboration with Government Research centres to keep abreast of technology pertaining to our field of operation in warship building
9. Our company has collaborative efforts with major industries in India to keep abreast of technology pertaining to our field of operation in warship building
10. Our company is engaged in foreign collaboration for R&D to keep abreast of technology pertaining to our field of operation in warship building

Independent variable - Technology & Research & Development

Dependent variable - Sustainability

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

1. Does your product meet International standards?
2. What percentage of Business work is conducted Internationally?
3. To what extent Global Economy affected business you are engaged in?
4. Our company utilise the Credit Linked Capital Subsidy Scheme (CLCSS) instituted by the Government of India providing upfront capital subsidy for Technology upgradation.
5. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Entrepreneurial and Managerial development.
6. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Intellectual Property Rights (IPR).
7. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Design Expertise in manufacturing sector.
8. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on providing marketing assistance.
9. Our company participates in the National Competitiveness Manufacturing Programmes (NMCP) on Technology upgradation and Quality upgradation support.
10. 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 Technology & Research & Development and Sustainability in warship building (R=0)

H_1: There is a significant relationship between Technology & Research & Development and Sustainability in warship building ($R \neq 0$)

Level of significance for testing hypothesis $\alpha = .05$

3.4 Data analysis

3.4.1 Having identified the measurement indicators and scales, a pilot study was undertaken. Data collection was done by farming out the questionnaires containing the indicators of Technology & Research & Development and Sustainability for response on a 5 point Likert scale, to 50 MSMEs involved in the warship building programme. In order to obtain representative samples, the questionnaires were farmed out to all the Government owned ship yards, PAN India; which includes Mazagaon Ship builders, Mumbai, Garden Reach Shipbuilders, Kolkata, Cochin Ship yard Ltd, Goa ship yard Ltd, Hindustan Shipyard Ltd, Visakhapatnam and as well to a private shipyard owned by L& T.

3.4.2 To ensure that the instrument is usable and effective, the data collected from 50 MSMEs was tested for Reliability and Validity. Since every item is measured using 5 point interval scale, Cronbach Alpha was used to confirm Reliability and construct validity used to examine the accuracy of the instrument. Construct validity includes Factor Loading and average variance extracted. The responses were tested for Reliability and Validity. The Average Variance Extracted for SBL is 0.615 for Sustainability construct and 0.52 for Technology & Research & Development construct. Cronbach alpha for Technology & Research & Development shows .878, a high reliability factor and for sustainability it is 0.761, above the threshold of 0.7.

3.4.3 Reliability Tests – Cronbach Alpha

Reliability

Scale: CRONBACH ALPHA Technology & Research & Development(TRD)

Case Processing Summary

		N	%
Cases	Valid	142	91.0
	Excluded[a]	14	9.0
	Total	156	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.878	10

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TRD1	27.65	50.696	.423	.877
TRD2	28.40	45.448	.654	.862
TRD3	28.54	44.775	.664	.861
TRD4	29.08	45.496	.454	.883
TRD5	28.25	46.659	.664	.862
TRD6	27.97	48.595	.592	.868
TRD7	27.80	47.876	.594	.867
TRD8	28.67	43.641	.728	.856
TRD9	28.58	44.771	.728	.856
TRD10	28.99	43.390	.631	.865

Reliability

Scale: CRONBACH ALPHA Sustainability (SBL)

Case Processing Summary

		N	%
Cases	Valid	149	95.5
	Excluded[a]	7	4.5
	Total	156	100.0

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

Reliability Statistics

Cronbach's Alpha	N of Items
.761	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SBL2	17.63	21.964	.030	.790
SBL3	19.88	20.323	.205	.772
SBL4	19.42	21.515	.087	.784
SBL5	20.42	20.692	.182	.773
SBL6	20.13	17.747	.659	.709
SBL7	20.21	17.504	.713	.702

SBL8	20.15	17.032	.698	.699
SBL9	20.23	18.424	.685	.712
SBL10	20.01	16.507	.749	.690
SBL11	20.41	18.514	.422	.741

Canonical Correlations

[DataSet1]

Canonical Correlations Settings

	Values
Set 1 Variables	TRD1 TRD2 TRD3 TRD4 TRD5 TRD6 TRD7 TRD8 TRD9 TRD10
Set 2 Variables	SBL2 SBL3 SBL4 SBL5 SBL6 SBL7 SBL8 SBL9 SBL10 SBL11
Centered Dataset	None
Scoring Syntax	None
Correlations Used for Scoring	10

Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	.731	1.145	.150	2.616	100.000	863.864	<.001
2	.667	.804	.323	1.852	81.000	784.473	<.001
3	.432	.230	.582	1.083	64.000	704.403	.313
4	.340	.130	.716	.867	49.000	623.796	.728
5	.289	.091	.809	.746	36.000	542.892	.861
6	.238	.060	.883	.632	25.000	462.141	.918
7	.192	.038	.935	.528	16.000	382.519	.932
8	.156	.025	.971	.409	9.000	306.801	.930
9	.063	.004	.996	.137	4.000	254.000	.969
10	.017	.000	1.000	.036	1.000	128.000	.850

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	9	10
TRD1	-.167	-.322	.501	.474	.220	.491	.674	-.286	.735	-.372
TRD2	-.159	.683	-.671	-.248	-.019	-.689	.779	-1.275	.174	.859
TRD3	.605	-.482	.103	.680	-.478	-.339	-.741	.915	.554	-.842
TRD4	-.153	-.099	-.246	-.085	.637	-.979	.769	.522	.176	-.371
TRD5	.747	.208	-.090	-.034	.824	.190	-.855	-.136	-.376	-.002
TRD6	-.472	.460	.696	.115	-.436	-.381	-.990	.148	-.807	.093
TRD7	.262	-.653	.153	-.729	-.018	-.193	.425	.192	.811	.503
TRD8	.095	.612	.307	.182	.008	.185	.985	1.046	-.445	.341
TRD9	.191	-.312	.176	-.825	-.210	.629	-.028	-.518	-.349	-.942
TRD10	-.333	-.540	-.111	.808	-.436	.380	-.417	-.991	-.600	.630

Set 2 Standardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8	9	10
SBL2	-.310	-.136	.489	-.213	.629	.258	.369	.307	.389	.263
SBL3	-.340	-.502	-.288	-.024	-.715	.198	.158	-.121	.009	.340
SBL4	.141	.634	.268	.371	-.115	-.080	.428	-.242	.337	.267
SBL5	-.046	.326	-.035	-.227	.064	.015	.524	.334	-.712	.501
SBL6	.345	.326	-.593	-.295	.045	1.235	.007	-.497	.265	-.405
SBL7	-.220	-.157	.462	-.732	-.148	-.874	-.793	.009	.414	.984
SBL8	.767	.208	-.418	.570	-.688	.229	.085	1.300	.193	-.306
SBL9	-.422	.286	.734	.064	-.307	.456	-.349	-.147	-.628	-.646
SBL10	.277	-.727	.323	-.391	.508	-.923	.913	-.862	-.362	-.015
SBL11	.180	-.270	.128	.898	.509	.463	-.391	.066	.146	.306

Set 1 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8	9	10
TRD1	-.209	-.403	.627	.593	.276	.614	.843	-.358	.920	-.465
TRD2	-.148	.638	-.627	-.232	-.018	-.644	.727	-1.191	.162	.802
TRD3	.537	-.428	.091	.604	-.425	-.301	-.658	.813	.492	-.748
TRD4	-.109	-.070	-.174	-.060	.452	-.695	.545	.370	.125	-.263
TRD5	.788	.219	-.095	-.035	.869	.201	-.902	-.144	-.397	-.002
TRD6	-.572	.557	.843	.139	-.527	-.461	-1.198	.179	-.977	.112
TRD7	.289	-.721	.169	-.806	-.020	-.213	.469	.213	.896	.556
TRD8	.083	.534	.267	.159	.007	.161	.858	.912	-.388	.297
TRD9	.184	-.300	.170	-.795	-.202	.606	-.027	-.499	-.336	-.908
TRD10	-.256	-.414	-.085	.619	-.334	.291	-.320	-.760	-.460	.483

Set 2 Unstandardized Canonical Correlation Coefficients

Variable	1	2	3	4	5	6	7	8	9	10
SBL2	-.372	-.164	.588	-.257	.757	.310	.444	.369	.468	.317
SBL3	-.373	-.551	-.316	-.026	-.785	.217	.173	-.132	.010	.373
SBL4	.172	.773	.327	.453	-.140	-.098	.523	-.295	.411	.325
SBL5	-.052	.371	-.040	-.259	.073	.017	.597	.380	-.811	.571
SBL6	.431	.406	-.740	-.369	.056	1.541	.009	-.620	.331	-.505
SBL7	-.285	-.203	.598	-.948	-.191	-1.131	-1.027	.011	.536	1.273
SBL8	.886	.240	-.483	.658	-.795	.264	.098	1.500	.222	-.353
SBL9	-.652	.441	1.134	.099	-.475	.704	-.539	-.227	-.969	-.998
SBL10	.307	-.804	.356	-.432	.561	-1.020	1.009	-.953	-.400	-.017
SBL11	.191	-.287	.136	.953	.540	.492	-.415	.070	.155	.325

Set 1 Canonical Loadings

Variable	1	2	3	4	5	6	7	8	9	10
TRD1	.091	.099	.753	.322	.248	-.024	.183	-.353	.270	-.138
TRD2	.570	.315	.208	.107	-.292	-.416	.240	-.453	.015	-.020
TRD3	.705	-.018	.148	.310	-.440	-.368	.091	-.103	.007	-.192
TRD4	-.027	-.460	.104	.093	.364	-.578	.268	-.043	-.429	-.208
TRD5	.694	-.005	.383	.117	.475	-.154	-.062	-.231	-.200	.107
TRD6	.022	.097	.836	-.036	-.047	-.466	-.097	-.195	-.149	.024
TRD7	.402	-.456	.539	-.281	-.048	-.269	.084	-.039	.020	.421
TRD8	.616	.052	.342	.176	-.206	-.048	.471	.083	-.425	.129
TRD9	.478	-.181	.278	-.215	-.267	-.141	.307	-.307	-.439	-.377
TRD10	.264	-.617	.099	.328	-.070	-.181	.212	-.199	-.527	.182

Set 2 Canonical Loadings

Variable	1	2	3	4	5	6	7	8	9	10
SBL2	-.263	-.217	.430	-.259	.199	.312	.388	.390	.434	-.055
SBL3	-.280	-.495	.017	.115	-.614	.298	.283	-.134	.068	.309
SBL4	.088	.518	.323	.330	-.308	-.052	.344	-.346	.342	.241
SBL5	.183	.233	-.064	-.163	.099	.207	.115	.149	-.688	.566
SBL6	.638	-.012	.125	-.445	-.084	.535	-.064	-.244	.036	.148
SBL7	.558	-.073	.437	-.400	-.230	.098	-.336	-.031	.034	.394
SBL8	.712	-.229	.394	-.133	-.344	.148	.087	.343	.046	-.033
SBL9	.229	-.087	.773	-.097	-.350	.315	-.105	-.054	-.283	-.135
SBL10	.697	-.411	.448	-.163	-.120	.051	.209	-.192	-.139	.014
SBL11	.440	-.311	.241	.425	.159	.317	-.266	-.133	-.241	.446

Set 1 Cross Loadings

Variable	1	2	3	4	5	6	7	8	9	10
TRD1	.067	.066	.325	.109	.072	-.006	.035	-.055	.017	-.002
TRD2	.416	.210	.090	.036	-.084	-.099	.046	-.071	.001	.000
TRD3	.515	-.012	.064	.105	-.127	-.087	.018	-.016	.000	-.003
TRD4	-.020	-.307	.045	.032	.105	-.137	.052	-.007	-.027	-.003
TRD5	.507	-.004	.166	.040	.137	-.036	-.012	-.036	-.013	.002
TRD6	.016	.065	.361	-.012	-.014	-.111	-.019	-.030	-.009	.000
TRD7	.294	-.304	.233	-.095	-.014	-.064	.016	-.006	.001	.007
TRD8	.450	.035	.148	.060	-.060	-.011	.091	.013	-.027	.002
TRD9	.349	-.121	.120	-.073	-.077	-.033	.059	-.048	-.028	-.006
TRD10	.193	-.412	.043	.111	-.020	-.043	.041	-.031	-.033	.003

Set 2 Cross Loadings

Variable	1	2	3	4	5	6	7	8	9	10
SBL2	-.192	-.145	.186	-.088	.057	.074	.075	.061	.028	-.001
SBL3	-.205	-.330	.007	.039	-.177	.071	.054	-.021	.004	.005
SBL4	.065	.346	.139	.112	-.089	-.012	.066	-.054	.022	.004
SBL5	.134	.155	-.028	-.055	.029	.049	.022	.023	-.044	.009
SBL6	.466	-.008	.054	-.151	-.024	.127	-.012	-.038	.002	.002
SBL7	.408	-.049	.189	-.136	-.067	.023	-.065	-.005	.002	.007
SBL8	.520	-.153	.170	-.045	-.099	.035	.017	.054	.003	-.001
SBL9	.167	-.058	.334	-.033	-.101	.075	-.020	-.008	-.018	-.002
SBL10	.509	-.275	.194	-.055	-.035	.012	.040	-.030	-.009	.000
SBL11	.321	-.208	.104	.144	.046	.075	-.051	-.021	-.015	.007

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	.215	.115	.214	.114
2	.095	.043	.095	.042
3	.198	.037	.151	.028
4	.050	.006	.081	.009
5	.082	.007	.086	.007
6	.101	.006	.075	.004
7	.055	.002	.061	.002
8	.058	.001	.055	.001
9	.097	.000	.095	.000
10	.048	.000	.087	.000

IV. Inference

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

(a) The measurement instrument formulated for the Technology & Research & Development as crucial for the MSMEs in Warship building and resultant Sustainability of MSMEs is reliable and valid.

(b) Wilks statistics shows 0.15. Hence, the unexplained variation is around 15 %, which indicates that there is much more explained variance compared to unexplained variance.

(c) In F test value of F(100,863) being 2.616 and p value is less than 0.001 well below .05, it is concluded that there is a significant relationship between "Technology & Research & Development " and "Sustainability" in warship building by MSMEs to achieve AAtmanirbhar Bharat.

(d) Value of R being 0.73; positive value of R indicates a direct relationship between variables "Technology & Research & Development" and "Sustainability". In other words, if "Technology & Research & Development" is enforced substantially, MSMEs involvement in warship building will also be enhanced and "Sustainability" will also move upwards. The value of canonical correlation being above 0.7 indicating a strong relationship between the two variables – Technology & Research & Development and Sustainability.

V. Conclusion

5..Evolving reliable and valid measurement indicators for the Technology & Research & Development that ought to be ensured by the MSMEs and their Sustainability in turn is a unique study by itself.. The measurements reveal that the Technology & Research & Development 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 Technology & Research & Development 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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