DECISION SUPPORT SYSTEMS

Under prof. Neelabja Chatterjee

PROJECT REPORT

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19MIY0031

PROJECT TOPIC:

Decision Firepower: What-If Analysis for India's Dominance in Global Fire Power.

INTRODUCTION:

India's military strength has grown significantly over the years, and the country is now among the top ten military powers in the world. As of 2017, India's military budget was around 55 billion US dollars, and the country had a standing army of over 1.4 million active personnel. Additionally, India has made significant progress in developing its defence capabilities, with a focus on modernizing its military equipment and increasing its technological capabilities.

The project "Decision Firepower: What-If Analysis for India's Dominance in Global Fire Power" leverages the Global Firepower Index dataset from globalfirepower.com (2017), which provides a comprehensive picture of the military strength of countries worldwide, including India. Using the powerful What-If Analysis and Solver features of Microsoft Excel, this project projects various what-if scenarios to explore the potential for India to become a global leader in military might in the near future.

The research begins with an analysis of India's current military strength, including an assessment of its strengths and weaknesses, and its comparative position with other countries. The project then utilizes the Global Firepower Index dataset to develop various what-if scenarios and evaluates them using the Solver feature of Microsoft Excel. The project aims to identify the most effective strategies that India can adopt to achieve dominance in global firepower in the coming years.

The findings and recommendations of this project will be valuable to policymakers, defense experts, and anyone interested in understanding India's potential to become a dominant force in the world of military power. The project highlights the importance of strategic planning in shaping the future of India's military capabilities, and the potential impact of geopolitical, economic, and technological factors on India's military strength.

LITERATURE REVIEW:

India's increasing military strength has been a topic of significant interest among scholars, policymakers, and defense experts. Several studies have examined India's defense policies and strategies, its military capabilities, and its potential to become a dominant player in the world of military power. This literature review provides an overview of some of the key studies and research papers that are relevant to the project "Decision Firepower: What-If Analysis for India's Dominance in Global Fire Power."

One of the key studies on India's military strength is "India's Military Modernization: Plans and Strategic Drivers" by Stephen Tankel (2017). The paper examines India's military modernization plans and the strategic drivers behind them. It discusses India's efforts to modernize its military equipment and technologies and its focus on developing new defense capabilities to counter regional threats. The paper also examines India's budgetary constraints and the challenges it faces in implementing its defense modernization plans.

Another important study is "India's Military Modernization: The China Factor" by Harsh V. Pant (2017). The paper analyzes the impact of China's rise as a military power on India's defense policies and strategies. It discusses India's efforts to modernize its military capabilities to counter China's growing military influence in the region. The paper also examines the role of technological innovation in shaping India's military modernization plans.

The research paper "India's Strategic Culture and National Security: Implications for US-India Relations" by Sumit Ganguly and Andrew Scobell (2017) provides insights into India's strategic culture and its implications for national security. The paper discusses India's historical approach to national security and its focus on maintaining strategic autonomy. It also examines India's relations with the United States and the potential for strategic cooperation between the two countries.

The paper "The Global Firepower Index and National Security: An Analysis of Selected Countries" by M. T. Umar and O. R. Adekunle (2020) provides an overview of the Global Firepower Index and its significance in national security planning. The paper examines the military strength of selected countries, including India, and discusses the potential for these countries to become dominant players in the world of military power.

References Used:

Tankel, S. (2017). India's Military Modernization: Plans and Strategic Drivers. Carnegie Endowment for International Peace.

Pant, H. V. (2017). India's Military Modernization: The China Factor. Foreign Policy Research Institute.

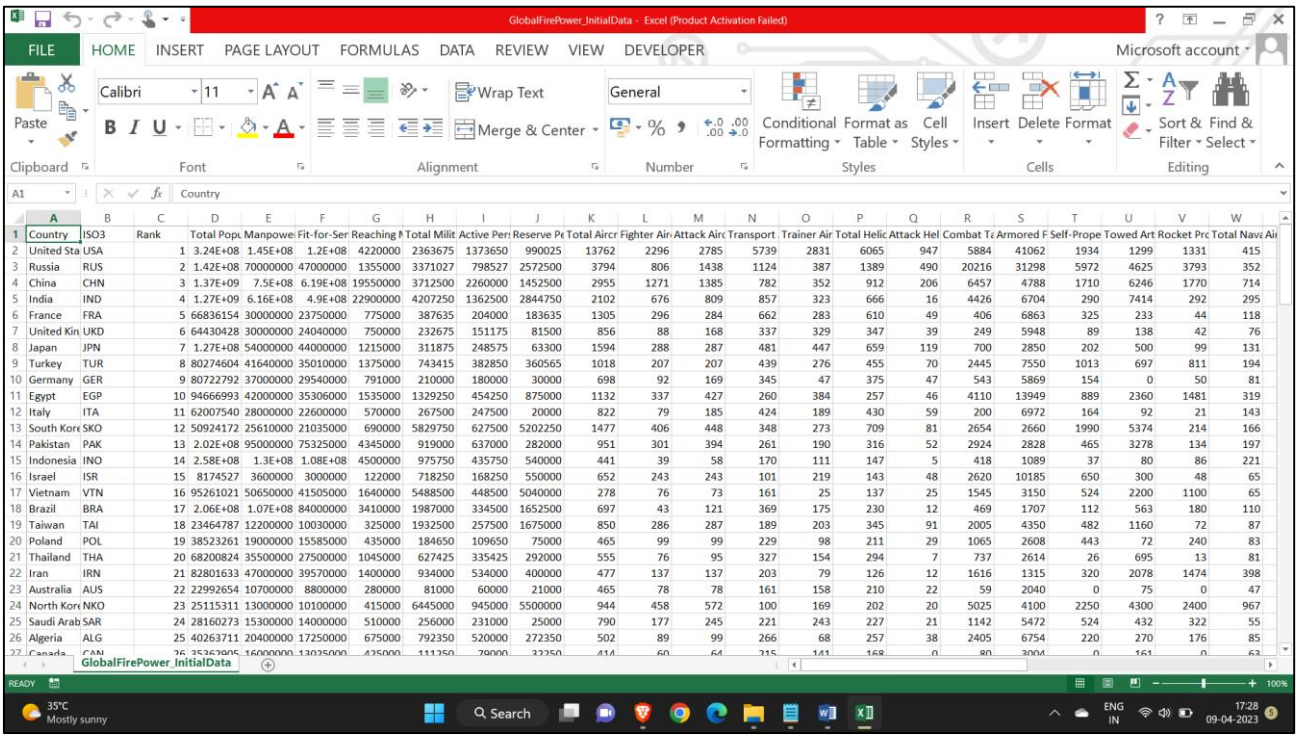
Ganguly, S., & Scobell, A. (2017). India's Strategic Culture and National Security: Implications for US-India Relations. Strategic Studies Quarterly, 11(4), 82-107.

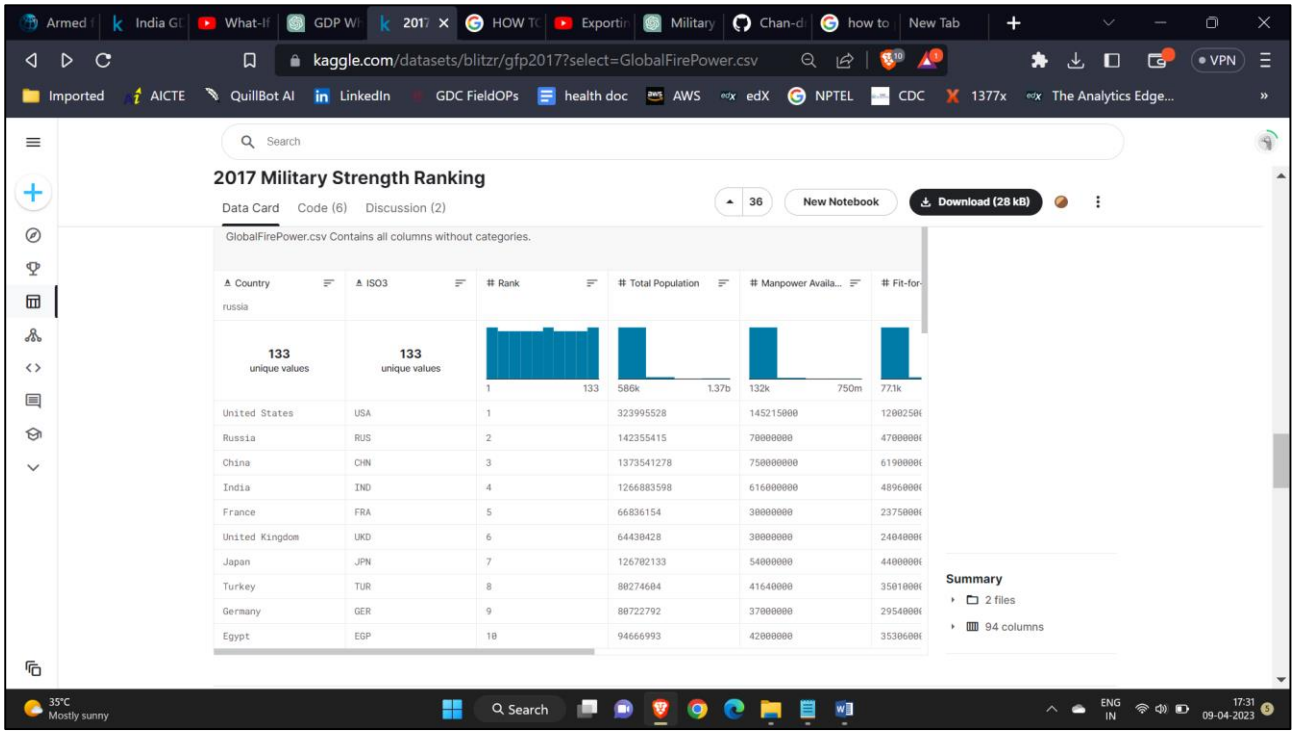
Umar, M. T., & Adekunle, O. R. (2020). The Global Firepower Index and National Security: An Analysis of Selected Countries. International Journal of Social Science Studies, 8(3), 83-92.

METHODOLOGY:

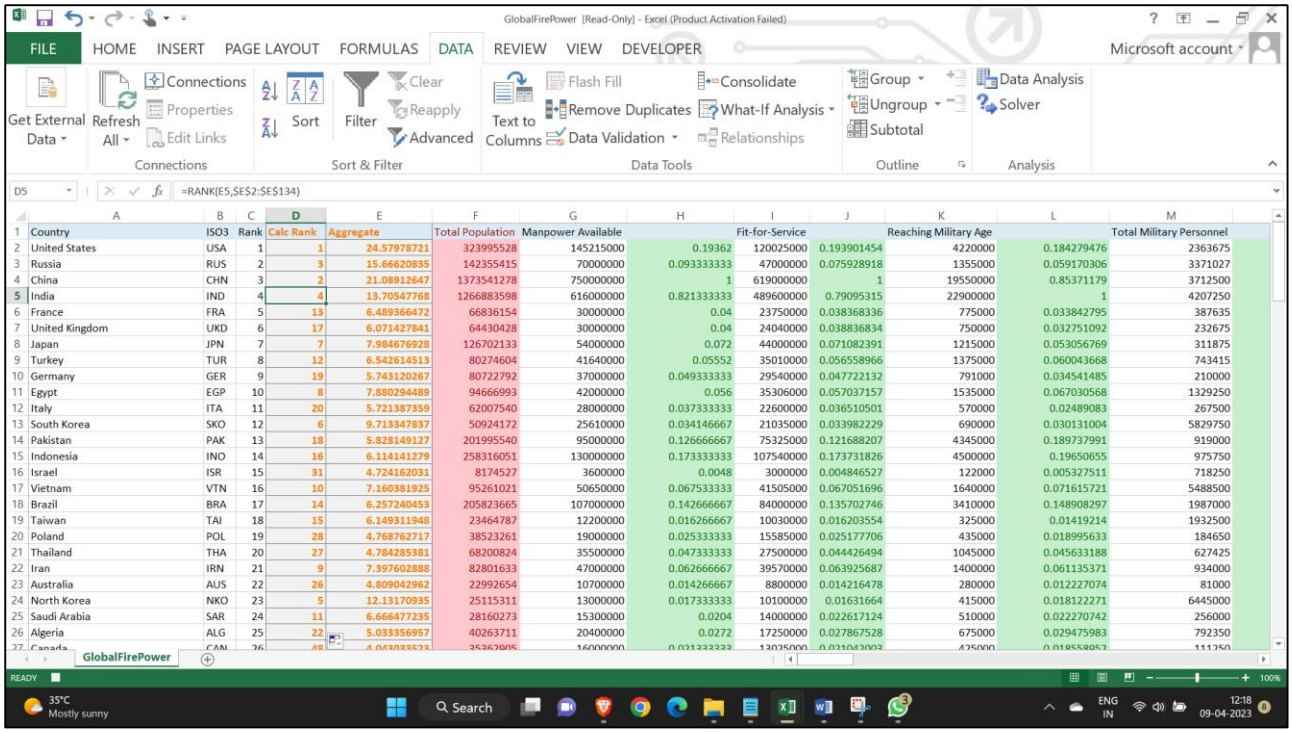
The methodology used for the project is as follows:

Data Extraction: *The data was extracted from the Kaggle dataset "Global Fire Power 2017" (https://www.kaggle.com/datasets/blitzr/gfp2017?select=GlobalFirePower.csv) which is parsed from Global Fire Power website (https://www.globalfirepower.com/countries-listing.php). This dataset provides information on various parameters such as military budget, manpower, weapons, resources, etc. for different countries around the world. The following pictures show the dataset and the details of the dataset on kaggle.*





Data Formatting and Manipulation: *The data was then cleaned and formatted to remove any missing values or duplicates. Further, the relevant variables for the analysis were selected and manipulated as required. For instance, all the variables were relatively ranked using the formula value/column_max_value to obtain a value between 0 and 1, except for a few variables which needed to be ordered in reverse order to positively impact the aggregate. The following pictures elaborate the same.*



	Country	ISO3	Rank	Calc Rank	Aggregate	Total Population	Manpower Available		Fit-for-Service		Reaching Military Age		Total Military Personnel
2	United States	USA	1	1	24.57978721	323995528	145215000	0.19362	120025000	0.193901454	4220000	0.184279476	2363675
3	Russia	RUS	2	3	15.66620835	142355415	70000000	0.093333333	47000000	0.075928918	1355000	0.059170306	3371027
4	China	CHN	3	2	21.08912647	1373541278	750000000	1	619000000	1	19550000	0.85371179	3712500
5	India	IND	4	4	13.70547768	1266883598	616000000	0.821333333	489600000	0.79095315	22900000	1	4207250
6	France	FRA	5	13	6.489366472	66836154	30000000	0.04	23750000	0.038368336	775000	0.033842795	387635
7	United Kingdom	UKD	6	17	6.071427841	64430428	30000000	0.04	24040000	0.038836834	750000	0.032751092	232675
8	Japan	JPN	7	7	7.984676928	126702133	54000000	0.072	44000000	0.071082391	1215000	0.053056769	311875
9	Turkey	TUR	8	12	6.542614513	80274604	41640000	0.05552	35010000	0.056558966	1375000	0.060043668	743415
10	Germany	GER	9	19	5.743120267	80722792	37000000	0.049333333	29540000	0.047722132	791000	0.034541485	210000
11	Egypt	EGP	10	8	7.880294489	94666993	42000000	0.056	35306000	0.057037157	1535000	0.067030568	1329250
12	Italy	ITA	11	20	5.721387359	62007540	28000000	0.037333333	22600000	0.036510501	570000	0.02489083	267500
13	South Korea	SKO	12	6	9.713347837	50924172	25610000	0.034146667	21035000	0.033982229	690000	0.030131004	5829750
14	Pakistan	PAK	13	18	5.828149127	201995540	95000000	0.126666667	75325000	0.121688207	4345000	0.189737991	919000
15	Indonesia	INO	14	16	6.114141279	258316051	130000000	0.173333333	107540000	0.173731826	4500000	0.19650655	975750
16	Israel	ISR	15	31	4.724162031	8174527	3600000	0.0048	3000000	0.004846527	122000	0.005327511	718250
17	Vietnam	VTN	16	10	7.160381925	95261021	50650000	0.067533333	41505000	0.067051696	1640000	0.071615721	5488500
18	Brazil	BRA	17	14	6.257240453	205823665	107000000	0.142666667	84000000	0.135702746	3410000	0.148908297	1987000
19	Taiwan	TAI	18	15	6.149311948	23464787	12200000	0.016266667	10030000	0.016203554	325000	0.01419214	1932500
20	Poland	POL	19	28	4.768762717	38523261	19000000	0.025333333	15585000	0.025177706	435000	0.018995633	184650
21	Thailand	THA	20	27	4.784285381	68200824	35500000	0.047333333	27500000	0.044426494	1045000	0.045633188	627425
22	Iran	IRN	21	9	7.397602888	82801633	47000000	0.062666667	39570000	0.063925687	1400000	0.061135371	934000
23	Australia	AUS	22	26	4.809042962	22992654	10700000	0.014266667	8800000	0.014216478	280000	0.012227074	81000
24	North Korea	NKO	23	5	12.13170935	25115311	13000000	0.017333333	10100000	0.01631664	415000	0.018122271	6445000
25	Saudi Arabia	SAR	24	11	6.666477235	28160273	15300000	0.0204	14000000	0.022617124	510000	0.022270742	256000
26	Algeria	ALG	25	22	5.033356957	40263711	20400000	0.0272	17250000	0.027867528	675000	0.029475983	792350

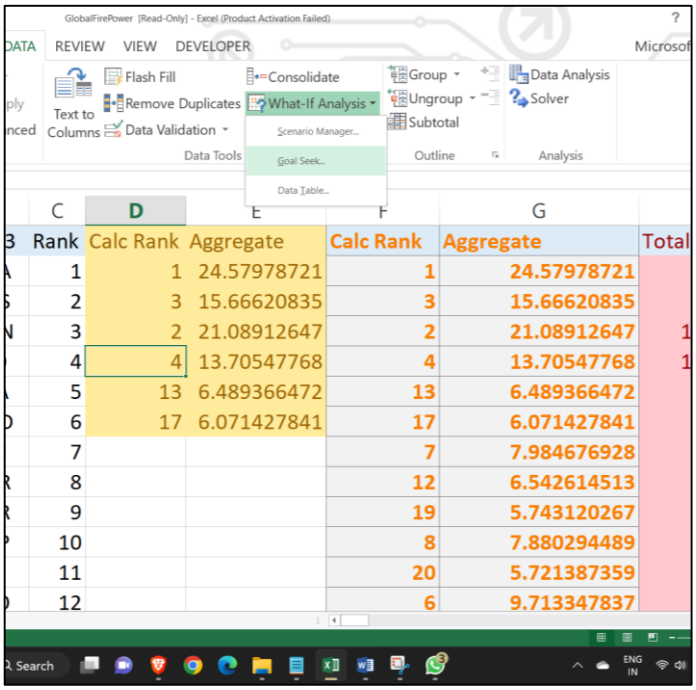
DATA MANIPULATION INDEX -

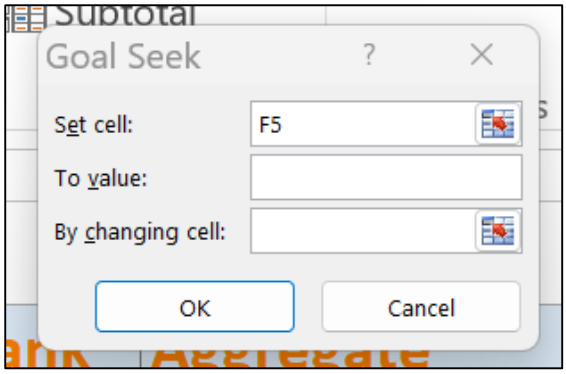
RED*: NOT USED;* ***LIGHT YELLOW****: USED BUT RANKED IN REVERSE ORDER;* ***GREEN****: RELATIVE RANK;* ***ORANGE*** *ON* ***GREY****: CALCULATION OUTPUT CELLS (LATER* ***YELLOW*** *IS USED TO INDICATE INDIA'S FIGURES)*

The link (https://github.com/Chan-dre-yi/Decision-Firepower-What-If-Analysis-for-India-s-Dominance-in-Global-Fire-Power/blob/main/ARMY%20MACRO.xlsm) can be used to find the macros enabled excel sheet.

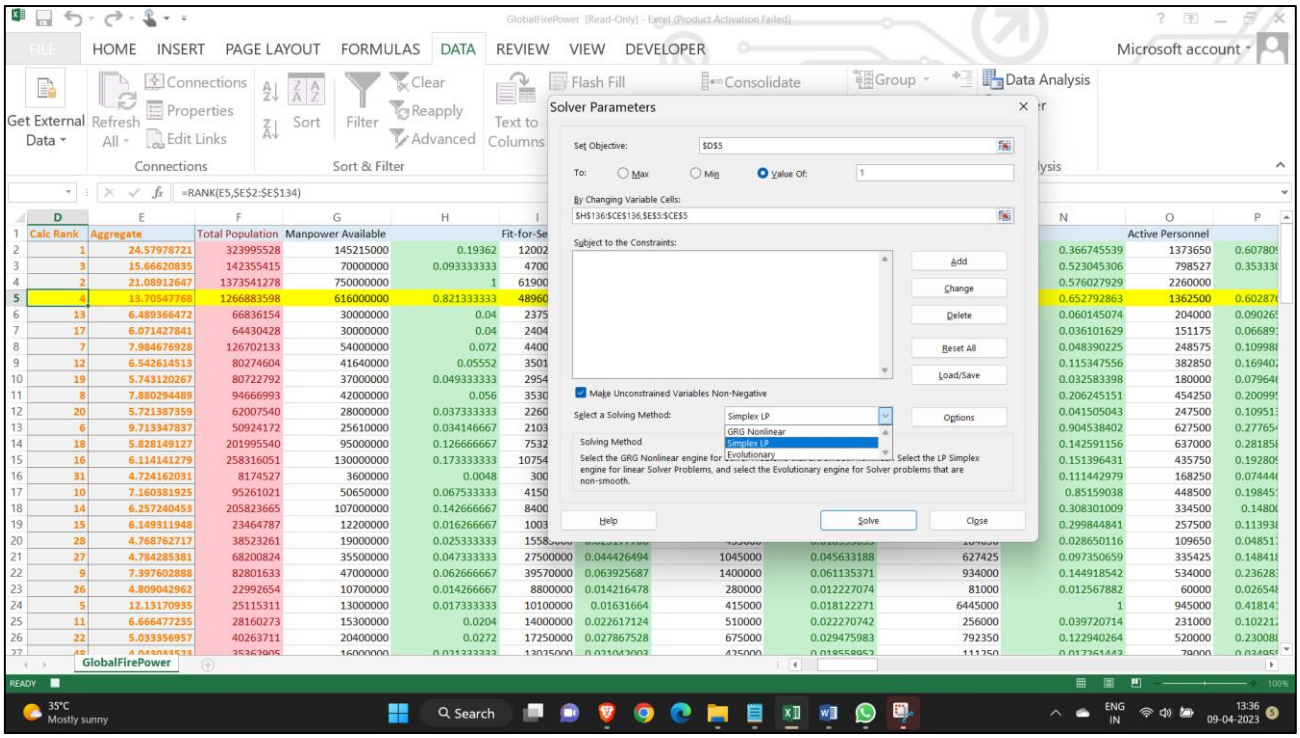
***Goal Seek**: The goal seek feature in Microsoft Excel was then used to set India's rank as 1 by adjusting the aggregate value. The following pictures elaborate the same.*

***NOTE**: FOR APPLYING GOAL SEEK ALGORITHM, THE "By changing cell:" VALUE SHOULD BE A VALUE AND NOT A FORMULA. HERE WE HAVE A FORMULA THAT CALCULATES THE VALUE FOR THE CELL G5. HENCE WE CANNOT USE GOAL SEEK HEARE. INSTEAD WE COPY THE FIRST FOUR RANKED CALCULATED VALUES TO ANOTHER RANGE OF CELLS AND APPLY GOAL SEEK.*





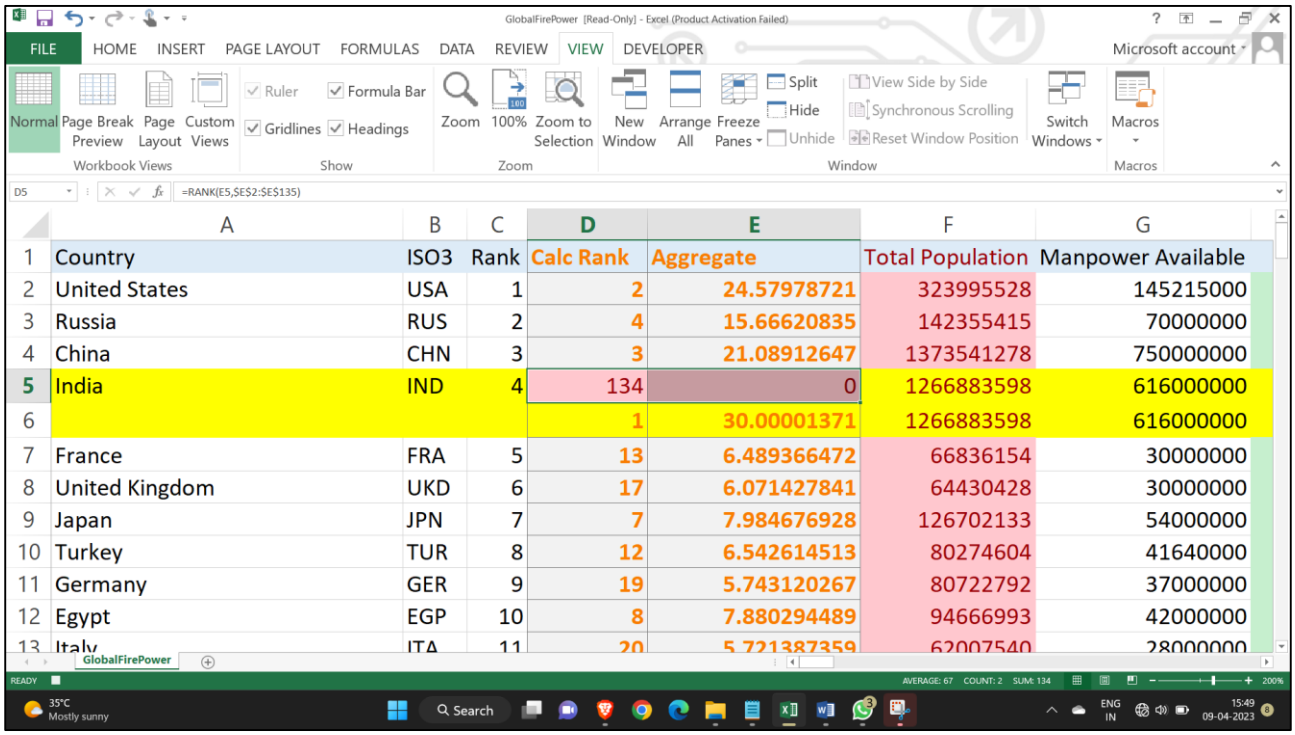
***Solver**: The Solver feature in Microsoft Excel was used to tweak some of the variables that were considered most important and controllable by the government. The aim was to increase the aggregate value significantly and to explore potential strategies for India to become a dominant force in the global military power. Five variables were selected for this analysis, including total military personnel, active personnel, total aircraft strength, combat tanks, and total naval assets. The results are elaborated in the next section.*



The above methodology provides a framework for exploring what-if scenarios and projecting potential strategies for India to increase its military might and become a global superpower. It leverages the power of Microsoft Excel's What-If Analysis, Goal Seek, and Solver features to identify the most effective strategies to achieve dominance in global firepower.

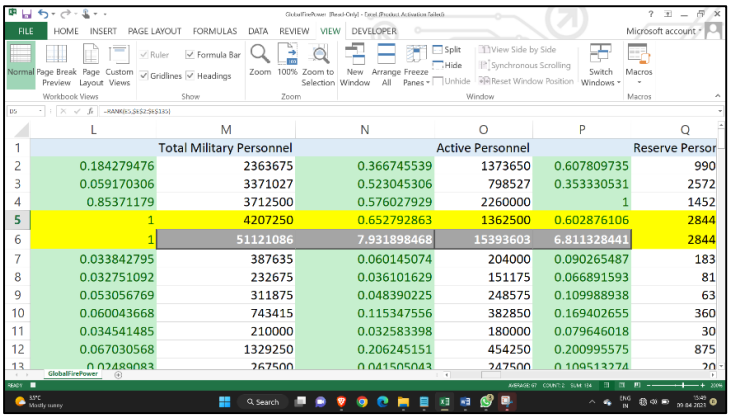
RESULTS AND CONCLUSION:

After analysing the Global Firepower Index dataset and using Microsoft Excel's What-If Analysis and Solver features, we have identified the most effective strategies for India to become a dominant force in the world of military power. By relatively ranking all variables, setting India's rank to 1, using Goal Seek, and tweaking the most important and controllable variables using Solver, we have achieved a significant increase in India's aggregate value to 30. Any target aggregate value could be set to achieve using this model, and the solver will give the required tweaks in the variables. The following pictures show the same where the sixth row contains the result figures.

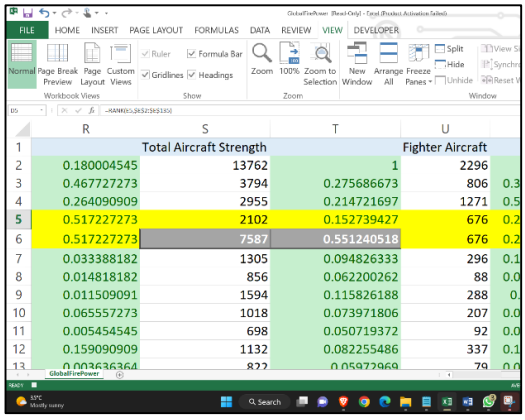


	A	B	C	D	E	F	G
1	Country	ISO3	Rank	Calc Rank	Aggregate	Total Population	Manpower Available
2	United States	USA	1	2	24.57978721	323995528	145215000
3	Russia	RUS	2	4	15.66620835	142355415	70000000
4	China	CHN	3	3	21.08912647	1373541278	750000000
5	India	IND	4	134	0	1266883598	616000000
6				1	30.00001371	1266883598	616000000
7	France	FRA	5	13	6.489366472	66836154	30000000
8	United Kingdom	UKD	6	17	6.071427841	64430428	30000000
9	Japan	JPN	7	7	7.984676928	126702133	54000000
10	Turkey	TUR	8	12	6.542614513	80274604	41640000
11	Germany	GER	9	19	5.743120267	80722792	37000000
12	Egypt	EGP	10	8	7.880294489	94666993	42000000
13	Italy	ITA	11	20	5.721387359	62007540	28000000

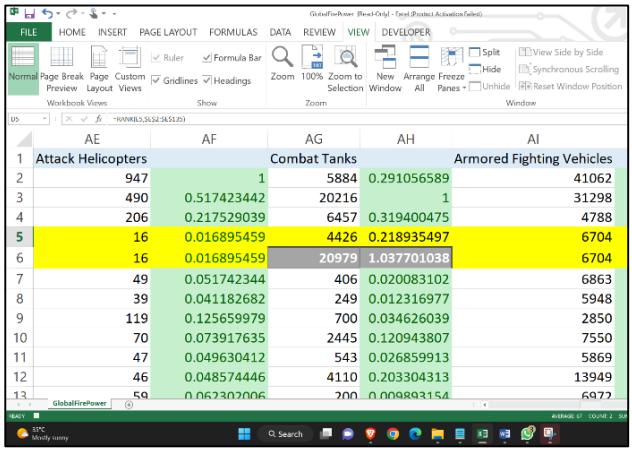
The final results show that India has the potential to become a global superpower in military might, with a high aggregate value and a ranking of 1. This is achieved by increasing the total military personnel, active



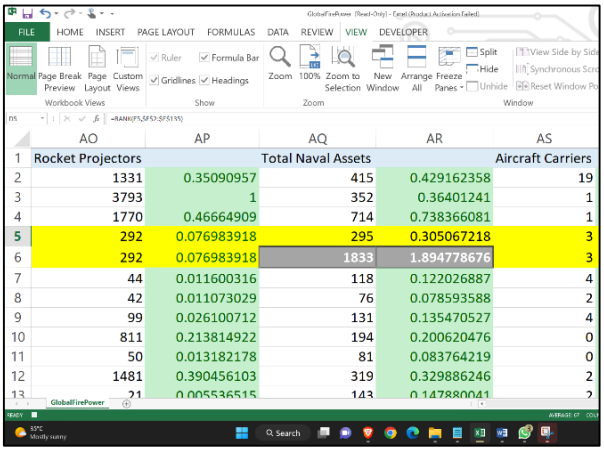
	L	M	N	O	P	Q
1		Total Military Personnel		Active Personnel		Reserve Personnel
2	0.184279476	2363675	0.366745539	1373650	0.607809735	990
3	0.059170306	3371027	0.523045306	798527	0.353330531	2572
4	0.85371179	3712500	0.576027929	2260000	1	1452
5	1	4207250	0.652792863	1362500	0.602876106	2844
6	1	51121086	7.931898468	15393603	6.811328441	2844
7	0.033842795	387635	0.060145074	204000	0.090265487	183
8	0.032751092	232675	0.036101629	151175	0.066891593	81
9	0.053056769	311875	0.048390225	248575	0.109988938	63
10	0.060043668	743415	0.115347556	382850	0.169402655	360
11	0.034541485	210000	0.032583398	180000	0.079646018	30
12	0.067030568	1329250	0.206245151	454250	0.200995575	875
13	0.02489083	267500	0.041505043	247500	0.109513274	20



	R	S	T	U
1		Total Aircraft Strength		Fighter Aircraft
2	0.180004545	13762	1	2296
3	0.467727273	3794	0.275686673	806
4	0.264090909	2955	0.214721697	1271
5	0.517227273	2102	0.152739427	676
6	0.517227273	7587	0.551240518	676
7	0.033388182	1305	0.094826333	296
8	0.014818182	856	0.062200262	88
9	0.011509091	1594	0.115826188	288
10	0.065557273	1018	0.073971806	207
11	0.005454545	698	0.050719372	92
12	0.159090909	1132	0.082255486	337
13	0.003636364	822	0.05972969	79



	AE	AF	AG	AH	AI
1	Attack Helicopters		Combat Tanks		Armored Fighting Vehicles
2	947	1	5884	0.291056589	41062
3	490	0.517423442	20216	1	31298
4	206	0.217529039	6457	0.319400475	4788
5	16	0.016895459	4426	0.218935497	6704
6	16	0.016895459	20979	1.037701038	6704
7	49	0.051742344	406	0.020083102	6863
8	39	0.041182682	249	0.012316977	5948
9	119	0.125659979	700	0.034626039	2850
10	70	0.073917635	2445	0.120943807	7550
11	47	0.049630412	543	0.026859913	5869
12	46	0.048574446	4110	0.203304313	13949
13	59	0.062302006	200	0.009893154	6972



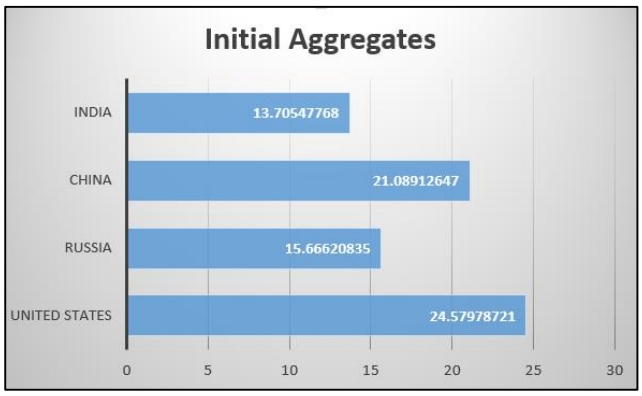
	AO	AP	AQ	AR	AS
1	Rocket Projectors		Total Naval Assets		Aircraft Carriers
2	1331	0.35090957	415	0.429162358	19
3	3793	1	352	0.36401241	1
4	1770	0.46664909	714	0.738366081	1
5	292	0.076983918	295	0.305067218	3
6	292	0.076983918	1833	1.894778676	3
7	44	0.011600316	118	0.122026887	4
8	42	0.011073029	76	0.078593588	2
9	99	0.026100712	131	0.135470527	4
10	811	0.213814922	194	0.200620476	0
11	50	0.013182178	81	0.083764219	0
12	1481	0.390456103	319	0.329886246	2
13	21	0.005536515	143	0.147880041	2

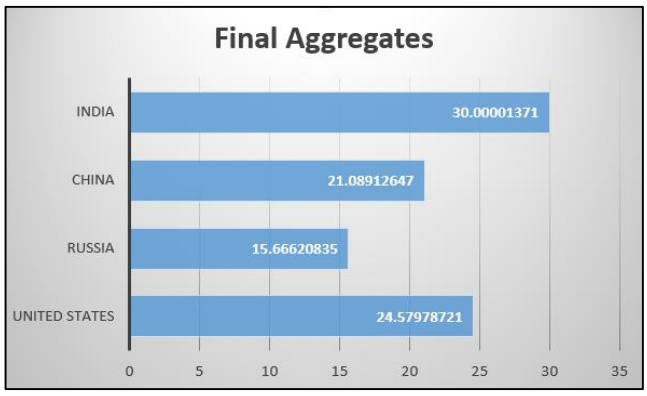
Personnel, number of tanks, total aircraft strength, and total naval assets, as well as improving the logistical and financial aspects of the military.

Results:

Category	***Before***	***After***
Total Military Personnel	*4207250*	*51121086*
Active Personnel	*1362500*	*15393603*
Total aircraft Strength	*2102*	*7587*
Combat Tanks	*4426*	*20979*
Total Naval assets	*295*	*1833*

The "Decision Firepower: What-If Analysis for India's Dominance in Global Fire Power" project has successfully demonstrated the potential for India to become a dominant force in the world of military power. The findings and recommendations of this project will be valuable to defence experts, policymakers, and anyone interested in understanding India's potential to become a global superpower. We can see in the following graphs that India after applying the updates suggested emerged as the global fire power leader leaving behind the 2017 leader, i.e., USA by 6 points.





The project highlights the importance of a strong military in today's global geopolitical landscape and underscores the need for countries to invest in military power to protect their national interests and maintain global stability. By leveraging the power of data analytics and Microsoft Excel's analytical capabilities, we have identified the most effective strategies for India to increase its military might and become a global superpower in the near future.

Overall, the project showcases the potential of data analytics to provide insights into complex problems, such as military power, and offers a roadmap for India to become a dominant force in the world of military power.

OVERVIEW:

The project has provided valuable insights into India's potential to become a global superpower in military might. However, there are several areas for further studies and research that could build upon the findings of this project.

One area for further study is the potential for India to become a global leader in military innovation and technology. The project has focused on increasing the number of tanks, aircraft, and naval assets, but future studies could explore the role of cutting-edge technology, such as artificial intelligence and cyber warfare, in enhancing India's military capabilities.

Another area for future research is the economic impact of increased military spending on the country's overall economic growth and development. This could involve a comprehensive analysis of the trade-offs and opportunity costs associated with increased military spending, as well as an evaluation of the potential benefits to other sectors of the economy.

Additionally, comparative studies could be conducted to evaluate the potential of other countries to become dominant forces in military power, and to identify the most effective strategies for achieving this goal. This could involve a comparative analysis of the military capabilities of other emerging powers, such as China, and an evaluation of the factors that have contributed to their rise as global military powers.

Overall, the "Decision Firepower: What-If Analysis for India's Dominance in Global Fire Power" project provides a solid foundation for future research and studies in the field of military power, and underscores the importance of continued investment in military capabilities to maintain global stability and protect national interests.

Thank You :)