SWOT Analysis

Major stakeholders (**Teachers** (*n=6*); MSc (2023-24)- **Thesis Student** (*n*=24); BSc 4th year – Project student (*n*=37); BSc 3rd year research student (*n*=4)

Strengths			
Possible Strength Questions	**Answer Pattern of each category of SWOT survey**	**Response* Person**	**Is it Strength?**
1.Do we have adequate molecular laboratory facilities (PCR/qPCR) to support dengue genomic surveillance for research performing?	Yes	6 (6)	Yes (6)
	Yes	22 (24)	Yes (22)
	Yes	37 (37)	Yes (37)
	Yes	4 (4)	Yes (4)
	Total responses of question No 1.	**97% (69 out of 71)**	**Yes**
2.What do you think about laboratory space and functional bioinformatics infrastructure (high-performance computers, software, internet), do we have?	Yes	6	Yes (6)
	Yes	17	Yes (21) No (3)
	Yes, we have limited laboratory space and bioinformatic infrastructure	4	
	Yes	32	Yes (36). No (1)
	Yes, we have limited laboratory space and bioinformatic infrastructure	3	
	Yes, but we have a little access to internet	1	
	Yes, we need upgrade regularly	1	
	No	1	
	Yes	4	Yes (4)
	Total responses of question No 2.	88% (63 **out of 71)**	
3.Do we have the capacity to obtain and maintain sufficient research grant funding to carry	Yes	6	Yes (6)
	Yes	13	Yes (20). No (4)
	Yes, team has previous experience	7	
	No	4	
	Yes	30	Yes (34). No (3)
	Yes, team has previous experience	2	
	Moderately Yes	2	
	No	3	
out this project effectively?	Yes	2	Yes (2). No (2)
	No	2	
	Total responses of question No 3.	87% (62 **out of 71)**	
4.Do we have	Yes	5	Yes (5) No (1)
	Yes, but we need to improve	1	
	Yes	14	yes (17). No (7)
	We have strong collaboration network and skilled workforce	3	
	No	7	

the capacity to scale up and optimize our research activities effectively?	We have skilled researchers and trained technicians	1	
	Yes	30	Yes (36). No (1)
	Yes, we have skilled human resource	3	
	Moderately yes with proper funding	2	
	No	1	
	We need improve	1	
	I think we have potential but can't go through due to not having the freedom to choose research field	1	Yes (1). No (3)
	No	3	
	Total responses of question No 4.	83% (59 **out of 71)**	
5.What internal strengths should be leveraged most to ensure project success?	Yes	2	Yes (6)
	Skill manpower and research facilities	2	
	Personal lab facilities, central lab	1	
	Research grants	1	
	Trained students	3	Yes (19). No (5)
	Strong research skilled faculty	4	
	Strong research team, sufficient funding, laboratory facilities	9	
	Having national and international collaboration	3	
	Work smart, work hard	3	
	No	5	
	Having strong faculty and researchers	2	Yes (35). No (2)
	Knowledge and ambition	1	
	Experience research team and strong collaborative capacity	3	
	Skilled researchers, existing lab, collaboration	1	
	Skilled and well-trained personnel available	1	
	Focus, adaptability, collaboration	6	
	New creative thinkers associated with the project	1	
	Qualified researchers	13	
	Setting a deadline and giving time for review	1	
	Proper management and efficient work	1	
	Repeat experiment multiple time to ensure result	1	
	Strong institution support	1	
	Molecular laboratory, bioinformatics	2	
	Regular meeting and idea sharing	1	Yes (4)
	Creativity and problem-solving capability	3	
	Total yes/positive responses of question No 5.	90.14% (64 **out of 71)**	
	Personal lab facilities	1	Yes (6)
	Capable	5	
	Efficient teamwork	1	Yes (22). No (2)
	Funding and sufficient laboratory equipment facilities	10	
	Effective project management	4	
	Quality research	5	
	Skilled personnel	2	
	Don't know	2	
	Potential research mind	3	
	Sufficiently capable	2	
	Consistency, domain knowledge, computational skills	3	
	Experience team	1	

6.What do others perceive our strength?	Capable of expertise infected by infectious disease	3	Yes (25). No (12)
	Hard working	1	
	Technical expertise, project execution govt. support	3	
	Our lab infrastructure connection within organization like ICDDR, B	3	
	Financial stability	1	
	Strong researchers and faculty	5	
	Collaborative work	3	
	Problem solving availability	1	
	No		
	Freedom of thoughts	1	Yes (3). No (1)
	Hard working	1	
	Diversified lab facilities	2	
	Total responses of question No 6.	78.8% (56 **out of 71)**	
7. Do the members of the research team have the necessary qualifications and expertise to successfully conduct this project?	Yes	6	Yes (6)
	Yes	22	Yes (22). No (2)
	No	2	
	Yes	30	Yes (32). No (5)
	Not fully qualified	1	
	Yes, the researchers team consist of qualified molecular biologist, bioinformatics	2	
	No	5	
	Yes	4	Yes (4)
	Total responses of question No 7.	90.1% (64 **out of 71)**	
8.Others?	This research project able to find out meaningful output	2	Yes (3). No (1)
	It will be a innovative work	1	
	Biosafety maintain capacity	1	
	Collaboration with national and international level	1	Yes(3). No(2)
	Access to clinical samples, ethical approval	1	
	Strong ethical review system	2	
	Commitment to public health impact and pandemic preparedness	1	
	We have strong collaboration with national institution	6	Yes(11). No(6)
	Biosafety controlling	2	
	Highly motivated researchers	1	
	Strong institutional support	3	
	Good laboratory safety	1	
	Sufficient knowledge	1	
	Sufficient knowledge, good working environment	1	
	Strong linkage, public health	1	
	Most of the students and teachers are passionate to research	1	
	@Total responses of question No 7.	61.5% (16 **out of 26)**	
Weakness			
Possible Strength Questions	**Answer Pattern**	**Response Person**	**Is it weakness?**

How do our available resources compare with those of similar one?	We need to upgrade	1	Yes(5). No(1)
	Yes	5	
	Advanced Equipment and lab facilities	15	Yes(18)
	Yes	1	
	By collaboration	2	
	Lack of Equipment and resources	23	Yes(9). No(26)
	Better compare with those of similar one	7	
	Nearly similar	1	
	Moderate	1	
	Limited	3	
	Moderately efficient but not utilized in a proper way	1	No(1)
	Total responses of question No 1.	61.5% (32 **out of 71)**	
In your opinion, which areas are considered our weakness?	Lack of Fund and expert RA	5	Yes(6)
	Proper biosafety maintenance	1	
	Funding	5	Yes(24)
	Lack of RA	1	
	Lack of Collaboration: 1	1	
	Advanced research equipment	17	Yes(54)
	Equipment, reagent and fund issue	30	
	Institution strong identity crisis	1	
	Limited administrative support	1	
	Proper work environment maintenance	2	
	Technical training	3	
	Communication, collaboration	1	Yes(4)
	Funding and lab equipment	3	
Which internal limitations or challenges could prevent the university from achieving the project objectives?	Geographical location	3	Yes (6)
	Trained personnel	1	
	Lack of permanent RA	1	
	Electricity issue	1	
	Funding issue and equipment	10	Yes (23)
	Political issue	2	
	Lack of RA	6	
	For not been famous	1	
	Administrative delay	1	
	Delay procurement	1	
	University vacation	1	
	Lack of fairness	1	
	Administrative delay	8	Yes (34)
	Proper funding	9	
	Punctuality	1	
	Lack of high specialized computer	2	
	Political obstacles	1	
	Lack of sufficient study and research interest	6	
	Limited RA and man power	7	
	Political issue and laboratory equipment	2	Yes (3)
	Freedom of choosing project	1	
	Collaborative research with industry and fund sharing	1	Yes (6)
	Political Violence	1	
	Fund cutting	1	
	University location	3	

Which external factors or situation that can affect our research?	Economic instability	1	Yes (22)
	Technological advancement	5	
	Funding issue, political issue	13	
	Supply chain	1	
	Rural area	1	
	Lack of expert technician	1	
	Funding issue and equipment	22	Yes (36)
	Limited collaboration	1	
	University Administrative issue	6	
	Political and law change	5	
	Authorities' perception	1	
	Lack of research knowledge	1	
	Lack of collaboration	1	Yes (4)
	Political involvement	1	
	Uncivilized environment	2	
Others?	Political issue and administrative issue	1	Yes (1)
	Waste management	1	Yes (5)
	Need to pay RA	1	
	Long term sustainability plan	2	
	Political stability	1	
	Location of university	2	Yes (11)
	Limited collaboration	3	
	Self-work, update	1	
	Administrative delay	*3*	
	Lack of quality research	2	

External Opportunities

Possible Strength Questions	**Answer Pattern**	**Response Person**	**Is it opportunity?**
In what ways can our core strengths be utilized to generate opportunities?	Training facilities and MSc, PhD scope	1	Yes (6)
	Skilled RA	1	
	National and international collaboration	4	
	Student must be skilled	1	Yes (23)
	Via collaborative research work and funding	10	
	Active research student	1	
	Utilization of the knowledge of PI and skill of RA	1	
	Internship, seminar, proper training	3	
	Utilizing expert team	1	
	Publishing research and training	2	
	Using molecular expert	4	
	Students are highly motivated to do research	2	Yes (30)
	Be collaborative	3	
	Development of early working system	4	
	Dedication to research	1	
	Trained personnel, Skilled students	6	
	Development of low-cost analysis procedure	2	
	By collecting funds	4	
	New technologies and research tools	2	
	Expand national genomic surveillance network	2	

	Proper opportunities for passionate students	1	
	Our strong academic background, motivational research team	3	
	Utilizing project or thesis ideas for article writing and publishing	1	Yes (4)
	Established multidisciplinary research collaboration	1	
	Attract national and international competitive research grants	1	
	Collaboration between labs	1	
What type of new technologies or tools (i.e. mulplex LAMP PCR marker) development are involved in our research?	Skilled RA	1	Yes (6)
	Advanced equipment (Multiplex PCR, LC-MS)	5	
	PCR based tools	4	Yes (22)
	CRISPR gene editing technologies	1	
	Multiplex, LAMP PCR, gel electrophoresis, ELISA	11	
	Sequencer, AP-MS, GC-MS, LC-MS-MS, GC-MS, HPLC	3	
	NGS	2	
	Lack of new technologies, lack of brand	1	
	Multiplex, LAMP PCR	13	Yes (36)
	TEM, CRISPR gene editing technologies, NGS	5	
	HPLC, SDS-PAGE	4	
	qPCR	4	
	Confocal laser scanning	4	
	Next generation sequencing	3	
	Genomic analysis tools, advanced molecular technique	3	
	Integration of bioinformatics, genetics and data analysis	2	Yes (44)
	Digital data management	1	
	NGS sequencer like Illumina / PacBio	1	
Do we have potential collaborative research facilities?	We need to improve	1	Yes (6)
	Yes	5	
	Yes, collaboration with hospital	4	Yes (21). No (2)
	Yes	15	
	Yes, but not sufficient	2	
	No	2	
	Average	1	
	Yes	27	Yes (30). No (5)
	No	2	
	Avalable but not satisfying	1	
	Collaboration with public health	2	
	Limited	2	
	Moderately	1	
	International research collaboration	1	
	Yes	3	Yes (4)
	Shared instrumentation platforms	1	
Others?	Srong research attitude	1	Yes (2)

	able to make collaborative research	1	
	Strong student resource	1	Yes (1)
	Increased global funding	2	Yes (9)
	Opportunities to receive Govt. non Govt funding	3	
	Publication in high impact journal	2	
	Make skilled person, increase PhD students	1	
	Proper fund	1	

Threats			
Possible Strength Questions	**Answer Pattern**	**Response Person**	**Is it Threats?**
What conditions (i.e. funding delay, budget cuts) can negatively impact on our research?	Funding delay	5	Funding delay, Proper justification during project evaluation, lack of equipment, Waste management
	Proper justification during project evaluation	1	
	Funding issue, lack of equipment	23	
	Yes	1	
	Delay funding:	34	
	Waste management	1	
	Lack of chemical and machinery	1	
	Lack of research interest	1	
	Funding delay	2	
	Procurement delay	1	
	Limited project expansion	1	
Are there any obstacles (i.e. procurement delay, external weather) that might affect achieving the goal?	Yes	3	Yes(5). No(1)
	No	1	
	Political shift	1	
	Lack of research knowledge	1	
	Yes	7	Yes(21). No(1)
	No	1	
	Nepotism	1	
	Procurement dela	3	
	Political change	6	
	Delay administrative approval	4	
	Political instability	2	Yes(32). No(1)
	No	1	
	Equipment maintenance	2	
	Reagent shortage	1	
	Yes	27	
	Import restriction	2	Yes(4)
	Remote location	1	
	Vacation	1	
Can data security and genomic data-sharing regulations affect achieving the goal?	Yes	3	Yes(4). No(2)
	No	3	
	Yes	21	Yes(22). No(1)
	No	1	
	Ethical approval Requirement	1	
	Yes	24	Yes(31). No(2)
	No	2	
	Policy and regulatory change	3	
	Ethical approval delay	2	
	Data sharing regulation	2	
	Yes	1	Yes(3). No(1)
	Data sharing	2	
	No	1	
	Competition with others research group	5	Competition with others research group, Research funding
	Research funding uncertainty	2	
	Political instability	1	
	Biosafety	2	

Others?	Mutation in dengue	1	uncertainty, Political instability, Biosafety, Mutation in denga are threats of the project

* Each of the category serially arranged: Teachers (*n*=*6*); MSc (2023-24)- Thesis Student (*n*=24); BSc 4th year – Project student (*n*=37); BSc 3rd year research student (*n*=4)

@=all participants are not responding

#opprtunity and threats cannot response only yes or no possible, only the major responses (predominantly “Yes” or “No”) are presented and summarized in the survey table analysis, without further qualitative interpretation.