Choosing/Completing a Research Project: Looking Like a Never-ending Myth???

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Often times, the post graduate students will be in total dilemma when they arrive at the stage of carrying out their major project. The foremost hurdle they normally face is in choosing the topic as vast number of literature papers are available to go through. Mostly, they get caught up in a vortex and they feel as if they have reached a dead end. The following step by step tasks would help them in choosing a better topic and complete their project works successfully.

1. Choose an area in which you are interested in. (say for eg. in Transportation Engineering they can be Traffic Operations, Transport Planning, Highway Geometric Design, Pavement Materials, and, Pavement Design).
2. Choose a topic within the selected area. (For eg. in Traffic engineering you can work on Capacity & LOS for interrupted or uninterrupted facilities, Traffic flow models, Driver behavioral models, Signal design and so and so forth).
3. Immediately after step 2, the objectives of the study are to be set. Remember that objectives are set for completing the project, not to find the gap or deficiencies in the literature review.
4. Every transportation related project or any project (if I may say so) has 4 basic objectives
   (i) Data collection and analysis
   (ii) Model development
   (iii) Model evaluation with different experiments
   (iv) Validation of the model
5. Firstly, all the existing literature related to the chosen topic within an area (say for eg. Driver behavioral modeling of traffic engineering area) is to be collected (spend atleast a week in just collecting the papers). At this stage, one should remember that each paper need not be reviewed in depth.
6. Once all the related papers are collected and glanced at a surface level, they can be sorted into sub-topics (say for eg. car-following behavior, lane-changing behavior, integrated movement behavior etc., belong to the topic of driver behavioral modeling in the area of traffic engineering).
7. After sorting the papers into subtopics, they have to be classified according to the model categories. (Say for eg. Empirical, Analytical, Probabilistic and, Artificial Intelligence).
8. After sorting the papers according to the model categories and understanding their respective advantages and disadvantages, the model category to be employed needs to be decided upon depending on its modeling principle and its capabilities in solving the research problem. Note that, until there is a strong and convincing technical basis for why a particular modeling category is suitable for solving a problem, nobody accepts it.
9. Once the model category is finalized, the focus now should be shifted to check what inputs may be required to develop a particular model after going through the exiting

literature papers in depth. In doing so, one will gain an in depth knowledge of the models that have been developed related to that specific category.

10. After gaining enough knowledge of what data inputs are required for developing a model of a specific category, whether all of the data can be acquired from the data collection site that one has at his/her hand needs to be checked. If not, the same has to be stated in the scope of the study.
11. If one finds that different data collection techniques are available while doing the literature review, it has to be made sure that the best one is chosen that satisfies all the requirements taking into consideration the feasibility(economical, availability) issues too.
12. After collecting the data, make sure to carry out enough analysis to find out whether there are any significantly different trends compared to the ones observed in the existing literature. This is where, most of the times, the need for the development of new models or a modification to the existing ones arises. Moreover, always try to emphasize the need to develop/modify the existing ones by analyzing the collected data statistically.
13. Once the model(s) are developed, considerable time has to be spent in designing different experiments that can be conducted with it to prove how better the proposed model performs. (Say for eg. Small hand worked out examples which can show the theoretical aspects of the proposed model, sensitivity of the model parameters, various simulation experiments etc.).
14. Different measures of effectiveness that can be obtained from the real world can be thought of to carry out the validation of the proposed model.

A check list table based on the above described tasks is given below for you to fill it up before starting your project work.

S.No	Task	Outcome
1	Areas of research available	
2	Chosen area of research	
3	Topics available in the chosen area of research	
4	Chosen topic	
5	No. of journal papers collected related for the chosen topic	
5	Sub-topics available in the chosen topic after a first glance at the collected literature	
6	Chosen sub-topic	
7	Modeling categories available in the literature for chosen sub-topic	
8	Advantages and disadvantages of each of the modeling categories	
9	Chosen modeling category and the reason for its choice	
10	Data inputs required for the chosen modeling category and the expected output	
11	Scope of collecting all the required inputs for the model development	
12	Different data collection techniques available	
13	Advantages and disadvantages of various data collection techniques	
14	Chosen data collection technique and the reason for its choice	
15	Planned data analyses and statistical tests	
16	Necessity for the development of a new model or modifications to the existing ones	
17	Proposed model (or) modifications	
18	Planned experiments to show the efficiency of the proposed/developed model	
19	Measures of effectiveness to be collected from the real world for validation of the proposed model	
20	Expected results	