

Process of Research and Development in Public Health

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Received May 02, 2019; Accepted June 03, 2019; Published September 07, 2019

ABSTRACT

Background: Research and Development (R&D) is one of the most useful researches in the development of professional development or the development of human life. Scientists, inventors and researchers apply the R&D process to create and invent new products/procedures for the changing world.

Objective: The purpose of this study was to develop a new process of doing R&D to use for doing R&D in public health.

Methods: A literature search for research books published within these several principles, quantitative designs, qualitative designs and mixed methods designs, over the last five years and categorized the books into one of the research designs.

Results: Process of research and development in public health are conductor: 1) evaluation situations, problems, needs; 2) finding and consideration new alternative/construct a hypothesis; 3) develop preliminary form of product; 4) preliminary field testing; 5) main product revision; 6) main field testing; 7) operational product revision; 8) operational field testing/operational; 9) final product revision/evaluation/create conclusion; and 10) distribution.

Conclusion: 10 processes of R&D activities high construct validity by all reviewed literature, experienced and the paper published were appropriate to be used for doing research and development in public health.

Keywords: Process, Research and development, Public health

INTRODUCTION

R&D is one of the research characteristics that great benefit to the task development, professional development or development of human lifestyle. Currently, many organizations have tried to encourage personnel affiliated with the knowledge and ability in research and development.

It is believed that R&D will provide new alternatives or methods. This will help to increase the efficiency of the operation which has the history and the long evolution to create innovation both science invention, world industry, and the business of the western world. Causing many important products of the world which has roles the thoughts and changes of human life as well as impacting changes continuously from past to present such as the discovery of vaccines, the invention of light bulb, development of machinery for production in industrial production, telephone, refrigerator, invented the method of contraception, the development of computer, and the birth of the Internet which have the greatest impact on communication of mankind, etc.

The concept of R&D can create breakthrough ideas and invent new invention of all disciplines such as scientific, industrial medicine, social sciences, humanities, arts, etc., there are many scientists and researchers have created the legendary research and development that are the source of

many innovations and inventions of the world. Let's take a brief example, The Wright brothers, Orville (August 19, 1871 to January 30, 1948) and Wilbur (April 16, 1867 to May 30, 1912), were two American aviators, engineers, inventors, and aviation pioneers who are generally credited with inventing, building, and flying the world's first successful airplane. When World War II (1939-1945) ended, much important research and development of new innovations and inventions occurred. United States Department of defense invested in the Advanced Research Project Agency Network (ARPANET) research to develop computers that can network and interaction cause ARPANET Network. This is the first network. Later, it was developed as an Internet network that could be linked worldwide. Network users can communicate quickly all over the world by using electronic mail (E-mail), chat, read or

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Citation: Boonda P. (2019) Process of Research and Development in Public Health. Int J Clin Case Stud Rep, 1(3): 61-65.

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comment (Web-board), information retrieval, internet telephony (VoIP), online learning (E-Learning), internet conference (Video Conference) and uploading information, etc.

The R&D has an important role in the competition and development of modern technology cause the company focus on the development progress of information technology (ICT) such as company Microsoft, the company Apple, CNN, Dell, Lotus Software, etc. With technological advances exponentially make the world's modern information communication system with the emergence of Wikipedia, Google, YouTube, Line, Facebook, etc.

It is believed that the advancement of technology will make human longevity with the advancement of medical science throughout history proved that this hypothesis is true. Have new medical innovations to meet human health needs. It facilitates the patient to live a good and easy living close to the normal person and technology has been developed to provide the most effective treatment with the expectation to look forward to that progressive technology will make human life more gradually.

From the evolution of the innovation development progress and the world's important invention past shows the role of scientists, inventors or researchers in observing problems, analytical thinking, synthesizing, building principles, concepts, and new knowledge systematically to design, test and the improvement until the invention is effective that based on R&D. The researcher is interested in creating a new process of doing R&D in the public health of practitioners in the health services network. "Regional Service Provider" that is an organization to solve the above-mentioned problems. The purpose of this study was to develop a new process of doing R&D to use for doing R&D in public health.

METHOD

A literature search for research books published within these several principles, quantitative designs, qualitative designs and mixed methods designs, over the last five years and categorized the books into one of the research designs.

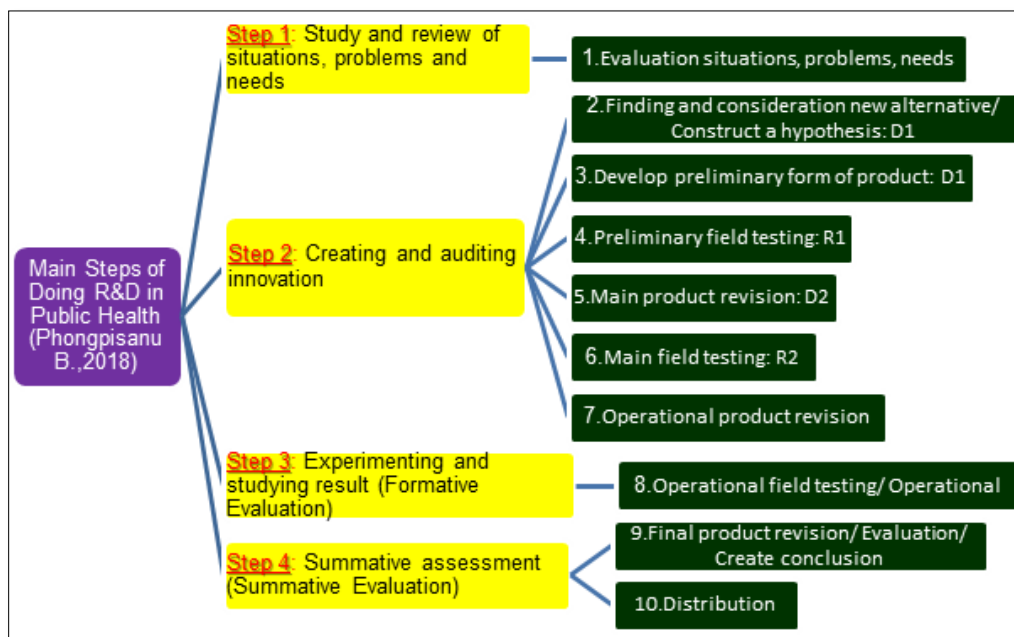
RESULTS

From the concept of educators and academics, the author has synthesized process of research and development to find the process with the consistent frequency and score of more than 50% there are 10 steps (**Table 1**): Evaluation situations, problems, needs (87.50%); Finding and consideration new alternative//Construct a hypothesis (62.50%); Develop preliminary form of product (100.00%); Preliminary field testing (75.00%); Main product revision (62.50%); Main field testing (62.50%); Operational product revision (62.50%); Operational field testing/Operational (87.50%); Final product revision/Evaluation/Create conclusion (100.00%); and Distribution (75.00%). Thus, the process of research and development included 10 steps as follows (**Figure 1**):

- 1) Evaluation situations, problems, needs
- 2) Finding and consideration new alternative/construct a hypothesis
- 3) Develop a preliminary form of product
- 4) Preliminary field testing
- 5) Main product revision
- 6) Main field testing
- 7) Operational product revision
- 8) Operational field testing/Operational
- 9) Final product revision/Evaluation/Create conclusion
- 10) Distribution

Table 1. Process of R&D.

Process of R&D	Borg & Gall (1979: 627)	Scientific Method	Rattana (2013)	Sirichai (2016)	Supak (2006)	Tanate (1997)	Tisana (1997)	Phongpisanu (2018)	Total	Percentage
1. Evaluation situations, problems, needs/research and development collection	✓	✓	✓	✓	✓	✓		✓	7	87.50
2. Planning	✓			✓					2	25.00
3. Finding and consideration new alternative/construct a hypothesis		✓		✓		✓	✓	✓	5	62.50
4. Develop a preliminary form of product	✓	✓	✓	✓	✓	✓	✓	✓	8	100.00
5. Preliminary field testing	✓	✓		✓		✓	✓	✓	6	75.00
6. Main product revision	✓	✓		✓		✓		✓	5	62.50
7. Main field testing	✓	✓		✓		✓		✓	5	62.50
8. Operational product revision	✓	✓		✓		✓		✓	5	62.50
9. Operational field testing/Operational	✓	✓	✓	✓	✓	✓		✓	7	87.50
10. Analyzing Data		✓			✓	✓			3	37.50
11. Final product revision/evaluation/create conclusion	✓	✓	✓	✓	✓	✓	✓	✓	8	100.0
12. Writing report				✓	✓	✓			3	37.50
13. Distribution	✓		✓	✓	✓	✓		✓	6	75.00

**Figure 1.** Correlation of the 10 processes of research and development with main steps of doing R&D in public health [2].

DISCUSSION

The following discussion summarizes the major procedural themes emerging across the corpus of studies included in this review of published qualitative studies. Specifically, these data illuminated patterns related to doing R&D procedural details. The patterns are a unique contribution to the qualitative literature because they provide further insight into the doing R&D procedures and publishing practices used by qualitative researchers. It can inform future research as well as methodology concerning qualitative doing R&D.

- 1) Evaluation situations, problems, need to be suggested by Borg and Gall [1]; Scientific Method [2-6]. It's step of collection and results of research which covers: 1) need evaluation, exploratory, audition related documents; 2) simple research, and 3) report preparation after then researcher decision that should be development production to researcher is convinced in the theory scope; and sufficiency of results to suggest guidelines in the development production interesting. The researcher must study documents, theories and articles related to production. In addition, information can sometimes be obtained by observing the field in matters related to the product, the need is created if needed or may be required to make small research to find the answer. The available research and theories can't be answered as mentioned. The purpose is to bring that knowledge to product development. Once the data has been collected as required proceed to the next step.
- 2) Finding and consideration new alternative/ construct a hypothesis those reported by Scientific Method [2-4,6,7].
- 3) Develop a preliminary form of a product suggested by [1-7]. It's planning research and development includes production preparation, production process and evaluation. The key principle of this procedure is the product structure must be determined in order to get the most out of the field test as possible.
- 4) Preliminary field testing suggested by [1,2,4,6,7]. It's Small group trials are preliminary experiments. The objective is to collect and analyze the preliminary results of the product, information from the interview, observations and inquiries were conducted with small samples such as 1-3 schools, 6-12 students.

It is important to create an experiment that is similar to the actual situation where the finished product is used in the trials are different from the actual situation. The researcher will face the problem of summarizing the results from one condition to another.

- 5) Main product revision suggested by Borg and Gall [1]; Scientific Method [2,4,6]. It's Product Review as a result of the 1st trial in the small group of step 4, ready to carry out the next large trial.

- 6) Main field testing suggested by Borg and Gall [1]; Scientific Method [2,4,6]. It's the experiment was conducted with a large group, such as 5-15 schools with a sample of 30-100 students. The pre-test and post-test assessments used the results of the evaluation are compared with the objectives or appropriate control group.

The main purpose of the large product trial is to indicate that the product is developed as the purpose of express development in the form of a behavioral objective. Regulations assessment research in large scale trials has been experiment research methodology popularly used.

- 7) Operational product revision suggested by Borg and Gall [1]; Scientific Method [1,2,4,6]. It's after analyzing the data obtained from the trial of the product with a large group; revise the product again to be effective and suitable to be used before the next large field trials.
- 8) Operational field testing/operational suggested by Borg and Gall [1]; Scientific Method [2-6]. It's after updating the product model to quality assurance; the researcher should take the model to trial to check availability. At this stage, we must use the largest experimental group, such as 10-13 schools, 40-200 students. Evaluation of data collection by interview, interview and observation then the data was analyzed.
- 9) Final product revision/evaluation/Create conclusion suggested by Borg and Gall [1]; Scientific Method [2-7]. It's improving the product using the results of field tests as a basis for improvement, then bring the product to publish.
- 10) Distribution suggested by many researchers [2-6]. It's propose products to the conference and publish in journals or may be published by other means, such as through mass media to bring the results of the research are widely disseminated and it is useful to all levels.

CONCLUSION

Processes of research and development in public health are conductor: 1) evaluation situations, problems, needs; 2) finding and consideration new alternative/construct a hypothesis; 3) develop preliminary form of product; 4) preliminary field testing; 5) main product revision; 6) main field testing; 7) operational product revision; 8) operational field testing/operational; 9) final product revision/evaluation/create conclusion; and 10) distribution which high construct validity by all reviewed literature, experienced and paper published were appropriate to be used for doing research and development in public health.

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