



Triangulation, a more than mixed approach: Revisiting social sciences research methodology

التثليث، أكثر من مجرد نهج مختلط، إعادة النظر في منهجية
البحث في العلوم الاجتماعية

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Abstract

Debates on research techniques in the social sciences have undergone significant changes since the beginning of the new millennium. This analysis focuses on methodological advances in the social sciences with a particular emphasis on the triangulation approach. The focus is not on the choice of investigation techniques but rather on the data collection techniques phase, analysis of data and corpora. In addition to our professional experience, we have also drawn on the documentary approach by relying on the most relevant publications on triangulation, its evolution, its applications in Algeria and its limits. Techniques for processing, interpreting and analysing data and discourse lie at the heart of scientific research. Although these techniques are increasingly accessible to everyone, with modern tools, their optimal use is not always trouble-free making the results questionable. One can access the most sophisticated techniques and “reproduce” the most complex mathematical formulas, but if the analysis is partial, biased or “weak”, these techniques would mask the absence of analytical thinking and the lack of objectivity of the results.

Keywords : Triangulation; Scientific Research; Analysis of data; Investigation.

ملخص

شهدت النقاشات حول تقنيات البحث في العلوم الاجتماعية تغيرات كبيرة مع بداية الألفية الجديدة. يسلط هذا التحليل الضوء على التقدم المنهجي في العلوم الاجتماعية مع التركيز على مقارنة التثليث بشكل خاص. غير أنه لا يقتصر على اختيار أساليب الاستقصاء فقط بل على مرحلة تقنيات جمع البيانات، تحليل البيانات والمجموعات. اعتمدنا، بالإضافة إلى خبرتنا المهنية، على النهج الوثائقي من خلال الاستناد على أهم المنشورات ذات الصلة بالتثليث وتطوره وتطبيقاته في الجزائر وحدوده.

تعتبر تقنيات معالجة وتفسير وتحليل البيانات والخطاب مخرجا بالنسبة للبحث العلمي. وعلى الرغم من أن هذه التقنيات أصبحت في متناول الجميع بشكل متزايد، مع وجود الوسائل الحديثة، إلا أن استخدامها الأمثل لا يخلو دائما من الشوائب مما يجعل النتائج مشكوكا فيها. يمكن للمرء الوصول إلى أكثر التقنيات تطورا و«إعادة صياغة» معظم المعادلات الرياضية الأكثر تعقيدا، ولكن إذا كان التحليل جزئيا أو متحيزا أو «ضعيفا»، فإن هذه التقنيات من شأنها أن تخفي الافتقار إلى التفكير التحليلي وعدم موضوعية النتائج.

كلمات مفتاحية: التثليث؛ البحث العلمي؛ تحليل البيانات؛ التحقيق.

Introduction

Any scientific activity produces knowledge is based not only on the state of previous knowledge, but also on the mental and attitudinal dispositions of the researcher whose scientific spirit presides over this activity of investigation and theoretical or empirical research and the climate of the environment conducive to research. The researcher's primary intention - a wish that may turn out to be pious - is to break with 'common sense' and the 'epistemological obstacles' that Gaston Bachelard highlighted as antagonistic to the construction of a science. It was Bachelard who best identified this entirely objective stance¹ in the unfolding of a standardised scientific approach. This attitude, this scientific spirit, is characterized by various principles, parameters or actions such as questioning, observation, reasoning, method and research techniques (at the centre of our analysis).

1. « All knowledge is an answer to a question. If there have been questions, there can be no scientific knowledge. Nothing is self-evident. Nothing is given ». Bachelard, G. (1934) La formation de l'esprit scientifique.

Just like the exact and experimental sciences, the social sciences (and humanities) have often been characterised by an approach that has made well-thought-out, planned choices to better design, organise and manage research in a given context in order to make it objective and scientific, while avoiding the obstacles of subjectivity, irrationality and convenience. It is therefore based on an intention, not always clear or well formulated, that the researcher will determine his choices, thus announcing the beginning of the conceptualization of his knowledge. What speciality? What object? What thematic niche for the collection of the mentioned data? Which dependent and independent variables? What space-time? As soon as his choices have been made, the researcher directs his research, which can be descriptive, comparative, classificatory or explanatory, inevitably inducing a methodology, i.e. an approach that is broken down into methods² and techniques belonging to a distinctive scientific approach in a field of research.

To speak of research methods and techniques is to refer to an arsenal of tools, instruments and operations capable of achieving the objective(s) that the researcher sets for himself, starting from an aim (an approach³) that he wants to give to his research, an orientation⁴ that can be multiple. He must then list the means of doing research in his scientific field, which range from observation (disengaged, situational, open, participant or systematic), to questionnaire (structured/semi-structured/unstructured), to interview (structured, semi-structured, closed, virtual, group interview), to experiment (simulated, provoked) or test (pre-test, post-test).

2. A method is a set of procedures and operations specific to a field of study with a view to achieving a given objective.

3. An approach is a way of using theory and data. It can be a description, an explanation, a classification or an understanding.

4. A research may be: fundamental, applied, synchronous/diachronic (longitudinal, cross-disciplinary), quantitative/qualitative, field-based, deductive/inductive, laboratory-based, documentary, global or sample-based, monographic, disciplinary, multidisciplinary, transdisciplinary, interdisciplinary, experimental, historical, dialectical.

Our reflection focuses on triangulation⁵ as a means of investigation to answer an issue, a method that is increasingly used in academic spheres. In the social sciences, investigative techniques, like techniques for exploiting data, do not come from nowhere. They are not frozen in time nor valid forever. They evolve according to the advances of the theories, the fields investigated and the objects or phenomena investigated. They are also impacted by technological progress, which is advancing at a lightning-fast and exponential rate. It is true that the boundaries between scientific disciplines are becoming less and less clear, but more and more flexible. In fact, interdisciplinarity is gaining ground, bringing together sciences that are looking for points of related interest.

However, the old scientific quarrels persist between the adepts of quantitative techniques and qualitative approaches. Each side still clings to its own position, claiming greater objectivity in the face of the complex reality of the subjects being studied and researched. Triangulation offers a more than mixed response, a third way, without affecting either the proponents or their respective chapels.

The discovery of triangulation is the basis of Mixed Methods Research (MMR). Triangulation is actually an “intelligent” combination of two techniques (qualitative and quantitative). Even if it is often associated with qualitative research, this gives rise to a third approach. It leads to a more refined vision of the research object, independently of the scientific disciplines and the theoretical positioning of the researchers on which the object is built.

In this paper, we limit ourselves to the genesis of triangulation without delving into the depth of theoretical and philosophical debates on mixed methods of research. Our focus is mainly on the central issue of tools for

5. «The logic of triangulation is based on the premise that no single method ever adequately solves the problem of rival explanations. Because each method reveals different aspects of empirical reality, multiple methods of data collection and analysis provide more grist for the research mill». (Patton, MQ, 1999: 1192).

processing and analysing results. It is quite counterproductive after all to invest in a research project, that one limits oneself to a reading of the results based simply on the “frequencies”⁶ of the most basic data, to a reproduction or juxtaposition of discourses or narratives without developing more in-depth analysis of the content.

In the context of clarifying the triangulation concept, four avenues are addressed: (i) what is the genesis of triangulation supporting the idea of technical but also theoretical diversity? (ii) How does triangulation respond to the complexity of social phenomena while building bridges between disciplines? (iii) What are the new techniques for exploiting data (qualitative or quantitative) that have improved and brought about a mutation of triangulation, without delivering a thorough analysis of the outputs. Finally, (iv) the implementations and the limits of triangulation are set up. Techniques cannot replace the analyst in commenting on the figures or in revealing and interpreting the deep meaning of the narratives and results.

The following sections (1 & 2) provide a contextualisation of the debates on research instruments and the progress achieved to date. The last two sections (3 & 4) provide methodological benchmarks for the implementation and choice of exploitation techniques that give more weight to the argument. These findings contribute to the necessary scientific rigour to the results, far from the “cosmetic” use of equations or figures often borrowed and pasted into the text, without any contribution to the knowledge produced. Equations are only essential when there is innovation.

1. Genesis and evolution of the triangulation approach

Triangulation, initially invented as a 3M “Multitraits and Multimethod Matrix” method (Campbell & Fiske, 1959), was finally named in a collective work (Webb, Campbell, Schwartz, & Sechrest., 1966), under

6. Frequencies are the simple calculation of the percentages for each question. It is the opposite of crosstabs, which requires the percentages to be crossed.

the concept of “triangulation”. It first appeared as a new methodology. This approach has undergone several changes. The original idea behind this approach is simple. Triangulation was primarily intended to justify the use of various qualitative techniques.

« In its original forms (...), triangulation referred only to the use of multiple forms of qualitative research methods, not the combination of quantitative and qualitative methods. It was also understood that each qualitative methodology -life story, case study, interviewing, ethnography, participant observation- rested on specific epistemological assumptions and each method had a complex disciplinary history » (Denzin, 2012, p. 82).

Subsequently, the triangulation approach will justify the use of several techniques, various databases, and several theoretical registers. The results gain in validity. In Denzin’s work (1978), there is mention of four types of triangulation: different databases, researchers from different disciplines, or various theoretical registers and multiple methodological approaches (p, 301). Other theorists confirm that triangulation is used to compare the sources chosen, the observers involved, the methodologies used, the theories implemented and the temporal or spatial dimensions studied in order to strengthen the internal coherence of the research (Creamer, E.G. 2024: Flick, U. 2018: Heale & Forbes, 2013).

Triangulation may not be suitable for some research projects, because it is not a ‘one-size-fits-all’ solution or a magic method, even if it has numerous advantages (Jick, 1979). In addition to gaining confidence through multidisciplinary, this approach is a stimulus for creativity and for the collection of the most relevant data. It can lead to the synthesis or integration of several theories. Finally, triangulation reveals the contradictions between the items to be analysed and makes scientific thinking evolve. Because of its exhaustiveness, it can be used for decisive tests, for the validation or not, of theoretical models. Triangulation is therefore an approach that breaks with the division between disciplines,

theories and investigative techniques. Instead, it encourages pooling and cross-disciplinarity, as it is an ideal approach for studies mobilizing researchers from different backgrounds with different but complementary profiles. In this way, we tend towards objectivity, the ultimate goal idealized in the formation of the scientific spirit.

Once the pitfall of using investigation and exploration techniques has been overcome, there remains that of the techniques of exploitation, interpretation and analysis of the results that are the subject of the last section. For the moment, it is necessary to see how triangulation has made its way into the social sciences, through the different forms and types of research.

2. Complexity of phenomena and the need for interdisciplinarity

Over time, social phenomena (languages, beliefs, religions, aesthetics, ways of feeling, living and acting, etc.) have not become more complex. They always have been. On the other hand, it is the research tools that have been improved, and inter/multidisciplinarity are now becoming more and more essential, particularly by study funding bodies.

However, the debates between specialization and interdisciplinarity are topical (Bühler, Cavaillé, & Gambino, 2006). Each discipline tends to protect its field of intervention. Nevertheless, we work together, or at least side by side. The object of study, the phenomenon to be observed, is marked by the outlook and spirit of each discipline and each researcher. Yet, systems thinking has indeed migrated from biology to the social sciences (Bertalanffy, 1968). In terms of investigative tools, interdisciplinarity, i.e. the contrast between the oppositions of views on a given subject, can erase the boundaries between disciplines. However, when we move on to analysis, the homogenizing vision of the specialist often resurfaces.

Several social disciplines (anthropology, psychology, geography, economics, history, etc.), as well as certain disciplines of the exact and

medical sciences (epidemiological research and biological studies) have integrated triangulation by bringing them together.

In addition, methodologists (Cresswell, 2007) have drawn up a typology of five types of interdisciplinary studies: (i) narrative studies, (ii) case studies, (iii) studies based on grounded theory, (iv) phenomenological studies, and finally (v) action research. This typology is constructed for information purposes only and does not claim to be exhaustive of the studies possible in all disciplines. This typology has the merit of building bridges between investigative techniques from different scientific disciplines.

3. Variants of triangulation and data processing

Before fully entering into the issue of data processing, it seems important to underline that there is no ready-made recipe for the mode of technical diversity (Denzin, 2012,) - we are getting closer to objectivity:

« The use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question. Objective reality can never be captured » (Denzin, 2012, p.83).

Other authors believe that each analyst can place his cursor on a *continuum* between a more quantitative approach with little qualitative data, or conversely, less quantitative data and more qualitative data (Morse, 1997). Similarly, it is easy to conduct interviews before moving on to the questionnaire, then conversely, to conduct a survey with “closed questions” before moving on to the construction of typologies and subsequently, to conduct in-depth qualitative studies, with interviews, biographies or life stories.

The issue raised in this text concerns less the tools of investigation than the techniques of processing the data collected and the discourses accumulated. The conflicts of paradigms at the basis of qualitative and quantitative techniques remain obstacles that cannot be ignored. Three epistemological positions are highlighted by *Corbière* and

Larrivière (2014), namely, the positivist, the constructivist and the neopositivist paradigms. The “war of paradigms” requires a more in-depth reflection, which goes beyond the objective in this contribution. Triangulation, with its multiple techniques, helps to overcome the supposed incompatibilities between the two methods. John Mingers (2001) contributes to the support of methodological diversity in the field of information systems research.

Whatever the methods used in the context of a given research, three distinct phases of processing must be respected: the preparation of the corpus or data, the exploitation itself, and then the reading, understanding, interpretation and discussion of the results. We can read the data in a statistics table, even with tests, but if there is no discussion of the results, we are left either with a paucity of ideas or with assertiveness.

The first question to be resolved is that of the minimum number of corpora or units that are essential to undertake research in social sciences. For example, how many units (people, organs, items) of the phenomenon should be retained? The units may be related to a typology or a prior classification of the research object. There is a certain consensus, in the social sciences, on a range from a minimum of five to a maximum of fifty units to have a corpus qualified as acceptable and usable (Baker & Edwards, 2012). Above all, it is important to note the date, place, duration and means as well as the conditions under which the interviews are conducted. These observations are important for the processing of the collected materials.

The size of the corpus is based on the principle of saturation, i.e. a number from which any other discourse, narration, text or additional communication means would not bring any added value. If the elements already identified are not checked, it would be pointless to continue processing the corpus, as this would result in repetition. For each qualitative technique, there is a saturation threshold that will be determined in the field by the researcher: whether it is Focus Group⁷,

7. Discussion group made up of people who are more or less concerned to get their opinion or their motivation.

Brainstorming⁸, Observation⁹, interviews, life stories, website screenshots, media communications. The saturation threshold is the equivalent of the representative sample of quantitative techniques.

Quantitative techniques are based on sampling to meet the criterion of representativeness, which is definitely the key to research. The representativeness of the sample is statistically validated when it has the same characteristics as the parent population. Sampling techniques are of two kinds: probabilistic or non-probabilistic. Probability samples are three-dimensional: simple random, stratified random, and cluster. Non-probability samples are just as varied: accidental, reasoned, voluntary, snowball, and stratified. This raises the question of the draw: with at least two key variables and one distinctive variable. For example, the most common choice is to take the age group and sex, to which is added an evolution variable, such as the duration of the phenomenon to be observed. Depending on the error threshold selected, the results are statistically tested for reliability.

(i) Preparation of the units and choice of exploitation technique

Once the corpus has been assembled or produced, it is advisable to opt for a content analysis technique, provided that the transcript of the material collected is complete and faithful. The distortion of content often results from an approximate translation, a mere summary or an overly succinct account of the speeches. This confusion leads to substantial loss and can invalidate, if not distort, the results obtained.

Many content analysis tools are constantly developing with technological progress. The first level of content analysis can be done manually or with the help of computer software which is most appropriate depending on the size of the speeches, texts, or images that are collected. A whole range of qualitative data processing tools are accessible on the web and can be mobilized to extract inferences and the desired or unintended

8. A meeting of people, each giving their opinion, views or suggestions. The idea is to solve collectively a problem.

9. Allows anyone to talk about things from the past. The aim is to distinguish between what is false and what is true, and to give meaning to things and people.

impact of texts: from the elementary thematic analysis of speeches and communications to “Text Mining” programs, including the most complex tools “Search Engine Optimization” (SEO), NVivo¹⁰, ATLAS-ti.

Quantitative data processing is no longer done manually. Researchers first used punch cards from the 1980s and then moved on to processing software, from the simplest to the most complex Data Mining and Big Data, depending on the sample size – SPSS, STATA, SPHINX. There is no need to refer to formulas and equations; they are integrated into the software. Nevertheless, it is important to process data from small samples (less than 30 cases) more in terms of actual numbers than percentages.

In the case of polling, once the survey has been carried out, the data must be cleaned before the actual analysis can begin. This is an important step in data preparation. It is during this step that frequencies of data to have a first overview of the results. Flat sorting should make it possible to recode the variables or to create new ones in order to have more or less homogeneous categories or response methods, eliminating extreme values.

Often, analysts stop at frequencies and a simple contingency table¹¹ to read the data, the most basic one that often leads to inconsistencies in styles, such as: there are 53.78% women and 46.22% men, as if human beings are divisible with two digits after the decimal point... In this specific case, we simply have to read that a little more than half of the respondents are women. It is also important to know how to read statistical tables – you cannot comment on every box in a table, indeed it is a useless repetitive exercise. Above all, it is important to highlight the contrasts noted by the data. Percentages should be calculated based on the independent variable, usually in columns. Having established this, we also need to explain why so few men agreed to take part in the survey.

10. Nvivo and Atlas-ti are the names of the software used to analyse qualitative or mixed data.

11. Method of presenting two statistical series in a simulated way.

(ii) Processing of analysis units

The units of analysis constructed for discourse or data require the results obtained to be rigorous and without major flaws. In both types of exploitation (qualitative or quantitative), the results must be replicable - with little nuance. Speech processing by NVivo and ATLAS-ti should give more or less similar results. Statistical estimates must also produce the same quantities under SPSS or STATA. Any analysis is thus based on a battery of indicators that are most significant for understanding or explaining the object of research.

(iii) Analysis, interpretation and discussion of results

The analysis of results is a decisive step in any technique for the exploitation and interpretation of speeches, texts or communications. It is not enough to line up cohorts of words of different sizes or colours. This process of quantifying the items, words according to the units, gives a frequency that must be read and interpreted according to the hypothesis on which the research is based. The analysis of the results can be separate from the discussion of the results. It also requires respect for ethics of research (as distinct from ethics in research)¹², particularly during written or oral presentation sessions. Interviewees or privileged informants should be kept anonymous. Any falsification of the answers is a serious breach of research ethics. Invalidated hypothesis also needs to be analysed and explained. The disclosure of the results of a study or research may result in censorship by the institution or the funder. The analyst can also opt for self-censorship by preventing himself from dealing with a question a sensitive theme or one that endangers dominant social norms. The product thus loses all objectivity.

12. Research ethics concerns the moral principles (respect, justice, benevolence, etc.) and values (responsibility and integrity) of individuals, and this is to ensure that there is no harm done to any stakeholder (institution or sponsor of the research), and that the research undertaken is accurate and honest. On the other hand, research ethics is a set of rules, principles and standards that must be respected and not falsified in order to avoid abuse, cheating or plagiarism in the processing of borrowed, fabricated or collected data.

Discussion of the results is the final stage of any paper, study or research project. This step of analysis is very important for scientific progress. We return, not only to the validation (confirmation/infirmation) of the initial hypotheses, but above all to the theoretical premises (attempt at theorisation) underlying the initial issue and the previous empirical findings established by other research on the same theme in human societies at a given time. This return to the presuppositions will not only confirm the state of an issue, but also advance knowledge in the direction of greater objectivity and proven exhaustiveness.

4. Implementations of triangulation: cases of research thesis in languages and social sciences

For the implementation of triangulation, some authors have proposed a six-step protocol (Farmer, et al, 2006). We can start by (i) sorting the data and the speeches; (ii) then categorising and classifying thematically; (iii) then carrying out an evaluation to identify the points of convergence and divergence. The next stage involves (iv) an analysis of the corpus as a whole, and (v) a comparative analysis of the data according to the sources, and (vi) the final stage concerns the feedback according to the researchers and stakeholders. This protocol seems quite elementary and is nevertheless widely followed in studies and research by mixed teams.

Triangulation is widely used in the field of medical sciences with results not only using several observation techniques but also researchers from various disciplines (Adams et al, 2016). In Algeria too, with the launch of the Health National Research Program, a research programme component is oriented towards the social sciences and humanities. In the context of research projects and studies, the implementation of triangulation can be reported in the first study on irregular sub-Saharan migrants in Algeria (SARP/CISP, 2007), study run by psychologist, sociologist and statistician. The study on brain drain in the Maghreb countries (Musette et al, 2016) also combined many disciplines – sociology, economics, politics and statistics. The implementation of triangulation is thus a reality in research, at least

with the mobilization of several researchers, often multidisciplinary – a first form of triangulation.

On the other hand, the implementation of triangulation by students at university would be a combination of more than one investigation technique or theory. Our hypothesis in favour of triangulation is also based on an empirical observation of doctoral thesis that are practised in the families of foreign languages and social sciences in Algeria. As far as foreign languages are concerned, it was not until the early 1990s that the first methodology courses¹³ were first developed in English departments. Nevertheless, it should be noted that it is, by far, the questionnaire that has been the most widely used methodological tool for decades. Whether structured, semi-structured or unstructured, with open-ended, closed-ended, multiple-choice or ranking questions, questionnaires continue to be the most common methodology tool. The numerical approach to the results obtained was the most used procedure as those concerned have had to follow it in the absence of a complete learning profile or appropriate training in statistics.

These days, larger and larger cohorts of doctoral students are opting for a more sophisticated statistical approach. Software is used for more advanced or more detailed analyses. The students used interviews (directive, non-directive, semi-directive, personal, informational, structured, unstructured, task-oriented, exit, etc.) first as a means of supporting the questionnaire, then as the sole means of comparison, but also as a means of confirming or invalidating working hypotheses.

Triangulation was carried out on the job at the instigation of individual thesis supervisors. More recently, thanks to advances in methodology, students have moved towards an approach that focuses more on content analysis (lexical, semantic, evaluative, etc.) through corpus¹⁴ linguistics,

13. In the specialities of sociolinguistics, linguistics, didactics.

14. Collection of authentic texts stored electronically, which can be used to discover information about language. Corpora are essential for the study of spoken and written language by examining text, speech, signs and gestures.

as well as documentary analysis (gathering available information) thanks to digital technology, whose resources are immeasurable. Similarly, documentary research, which is rather underestimated as a research strategy, also enables you to identify and find appropriate data and information on a chosen theme and to cross-reference it. However, few theses collect their data through life stories technique, which is so meaningful for anthropological research. It is true that the duration of a degree research often reduces the range of methodological choices made by students thus imposing oft-trodden methodological paths making research a very dull and repetitive enterprise, which is not.

Conclusion

Social science research is a process of constructing an object to be investigated, sometimes with multiple aims. It can start with a simple description of a phenomenon or its exploration, followed by an explanation. It may also involve solving an issue, confirming or refuting results obtained by other research experiences, or experimenting with new theories or research techniques. It can also be the implementation of a new practice or innovation. For all these purposes, the social sciences offer a whole range of investigative methods and techniques that digital technology has developed through tools such as word-processing software, data collection, collation and classification tools, as well as larger and more diverse digital corpora.

This paper sets out the triangulation method for understanding this approach in academic exercise, study (dissertation or thesis), or research (article) projects. This scientific approach is based on a plural approach that allows a maximum of information to be collected from several sources and from several angles depending on the research focus or working hypothesis.

Our purpose, above all, is to explain how to make optimal use of the techniques used to exploit the data or the discourses collected in accordance with the ethics of scientific research, namely integrity and intellectual

honesty. Clearly, such a process is not a panacea, but it is true that it is time-consuming, which is why the duration must be quantified to avoid inappropriate time management.

Finally, the mixed or multi/multi-methodological approach allows the researcher to use one research method/technique, to combine it with one or more others, and to use it alternately, simultaneously or successively. Under such conditions, research inevitably tends towards recognised qualities such as originality, reproducibility, which are less a question of renewing knowledge than of the way in which data is used or examined, but also of building relevance (scientific or societal) and obtaining scientific merit (quality and contribution), which triangulation makes it easier to achieve.

References

1. Bachelard, G. (1934). La formation de l'esprit scientifique. https://gastonbachelard.org/wpcontent/uploads/2015/07/formation_esprit.pdf
2. Baker, S.E., & Edwards, R. (2012). How many qualitative interviews is enough? National Centre for Research Methods Review Paper. http://eprints.ncrm.ac.uk/2273/4/how_many_interviews.pdf
3. Bertalanffy, L. V. (1968). General System Theory : Foundations, Development, Applications. p. 37. https://monoskop.org/images/7/77/Von_Bertalanffy_Ludwig_General_System_Theory_1968.pdf
4. Bühlera, È.-A., Cavaillé, F., & Gambino, M. (2006). Le jeune chercheur et l'interdisciplinarité en sciences sociales: Des pratiques remises en question. Dans *Natures Sciences Sociétés*, 14 (4), 392-398.
5. Campbell, & Fiske. (1959). Convergent and discriminant validation by the multitrait multimethod matrix. *Psychology Bulletin*, 56(2), 81-105.
6. Creamer, E.G. (2024). Visual Displays in Qualitative and Mixed Method Research: A Comprehensive Guide. DOI:10.4324/9781003303602
7. Cresswell, J. W. (2007). Qualitative Inquiry: Research Design - Choosing among five approaches. Sages. <https://revistapsicologia.org/public/formato/cuali2.pdf>.
8. Corbière, M., & Larivière, N. (Éds). (2014). Méthodes qualitatives, quantitatives et mixtes. Dans la recherche en sciences humaines, sociales et de la santé. Québec : Presses de l'Université du Québec.

9. Denzin, N. K. (1978). *The research act : a theoretical introduction to sociological methods*. New York: Praeger.
10. Denzin, N. K. (2012). Triangulation 2.0*. *Journal of Mixed Methods Research*, 80-88. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.832.6263&rep=rep1&type=pdf>.
11. Flick, U. (2018). *Doing Triangulation and Mixed Methods*. SAGE Publications Ltd.
12. Heale, R. Forbes, D. (2013). *Understanding triangulation in research*. Published online 2013. DOI: 10.1136/eb-2013-101494.
13. Jick, T. (1979). Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly*, Vol. 24, No. 4, Qualitative Methodology. (Dec., 1979),, 602-611. https://www.pm.lth.se/fileadmin/_migrated/content_uploads/Jick_1979__Mixing_qualitative_and_quantitative_methods_-_Triangulation_in_action.pdf
14. Mingers, J. (2001). *Combining IS Research Methods: Towards a Pluralist Methodology*.
15. *Information Systems Research, INFORMS*, vol. 12(3), pp 240-259
16. Morse, J. M. (1997). Considering theory derived from qualitative research. In J. M. Morse, *Completing a qualitative project - Detail and dialogue* (pp. 163-190). Sage Publications. doi: <https://doi.org/10.1177/1049732304269676>.
17. Musette Mohamed Saib et al. (2016). *Fuite des cerveaux ou mobilité des compétences ? Une vision du Maghreb*. Algiers : CREAD/BIT.
18. SARP/CISP (2007). *Profils des migrants subsahariens en situation irrégulière en Algérie*. https://www.researchgate.net/publication/271372775_PROFILS_DES_MIGRANTS_SUBSAHARIENS_EN_SITUATION_IRREGULIERE_EN_ALGERIE
19. Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. (1966). *Unobtrusive Measures: Nonreactive Research in the Social Sciences*. Chicago: Rand McNally.