Blinded by Science: An Entrepreneurial Marketing Perspective of Understanding

Robert M. Peterson
Dr. Robert B. Pamplin, Jr. School of Business
University of Portland
Portland, Oregon
USA

Abstract: Science has become a powerful tool for examining our bodies, our environment, and our universe. In fact, we have adopted science as the technique of choice for examining most phenomena. The intent of this manuscript is to critique the role of science as it pertains to investigating social phenomena, i.e. entrepreneurship, and offer a highly unique twist on the discourse. An overview of historical scientific results leads into the introduction of a Social Periodic Table. The conclusion is that science is quite often the improper tool to use in order to capture the essence of entrepreneurial phenomena. Some suggestions are offered for future research perspectives. The paper does not rehash the science debate from the 1980s marketing literature.

"SCIENCE IS NOTHING BUT PERCEPTION."

(Attributed to Plato)

INTRODUCTION

Why is the sky blue? How does the body process alcohol? Whose DNA is this? At what rate do bodies of mass fall? Where is the earth in relation to the sun today? How does one create a lasting and profitable enterprise? All of these questions can best be answered by science, with the probable exception of one. Yet, many people will use scientific methods in order to purport an answer to the last question, or ones similar to it. Science has become a powerful tool for examining our bodies, our environment, and our universe. In fact, we have adopted science as the technique of choice for examining most phenomena. Science is similar to the old adage, "give a boy a hammer and soon every problem he encounters requires the use of the hammer." Anytime theory builders (i.e., researchers) are faced with problems, they most often reach for their "science hammer" in order to explore phenomena. They smash away until the square phenomenon fits
into the round construct. The splintering of the wood around the hole is immaterial to many researchers; all that matters is that it appears to fit from an arm’s distance. However, Gilmore and Coviello’s (1999) findings suggest that perhaps marketing/entrepreneurship studies may be more willing to use other tools than just science.

The intent of this paper is to critique the role of science as it pertains to investigating social phenomena. The research question is thus: Is science, conventionally defined and understood, an appropriate mode of inquiry for investigating social phenomena, in general, and entrepreneurial marketing phenomena, in particular? The aim is to set in motion a discussion as to the appropriateness and usefulness of science in comprehending entrepreneurial issues and phenomena with the hopes of attaining rigor with relevance in our research. In an attempt to preclude wallowing in the marketing "crisis" literature of the 1970s and 1980s, only a few "emeritus" works will be cited.

The structure of this paper is as follows: a common definition of science is first outlined, then an interpretation of the history and usage of science is articulated, which is followed by the introduction of a Social Periodic Table. Lastly, the use of science in entrepreneurship is addressed and avenues to proceed are offered.

A DEFINITION OF SCIENCE

Not long ago, in science years, actually – 1963, Buzzell stated in a Harvard Business Review article, "satellites in orbit, polio vaccine, and television are tangible pieces of evidence that science conquers all" (p.32). A mere thirty years later and those milestones appear to be baby steps. At what boundary can the science army be defeated? Can it truly conquer all? Does science possess magical powers? What does science include and exclude in its domain?

Buzzell (1963) defines Science as:

1. A classified and systematised body of knowledge
2. Organised around one or more central theories and a number of general principles
3. Usually expressed in quantitative terms
4. Knowledge which permits the prediction and, under some
At present, this is a popular definition of science. As such it by no means constitutes an agreed upon delineation of what science has meant to different academic disciplines, nor has it been perfectly stable over time.

THE EVOLUTION OF SCIENTIFIC THOUGHT

For centuries, philosophers and scientists have argued over the definition of science, the role of science, and the limits of science. Plato considered observations and experiments meaningless, even harmful, to the domain of abstract ideas. He believed that mathematics was the proper educational device for training the mind in abstract reasoning. Plato's beliefs were one of the catalysts for the elementary structures of arithmetic, geometry, and astronomy. The greater hope was that advances in these areas would assist in the growing needs of engineering, time computation, accounting, land measurement, and agriculture.

In many areas of science during the Middle Ages, the Chinese achieved advances well ahead of their European counterparts. They devised the first horse saddle (200 BC), bureaucracy, porcelain, a primitive seismograph during the Han dynasty (202 BC - 220AD), paper (105 AD), and gunpowder (1000 AD) to name but a few discoveries. The Chinese were predominantly a technological, rather than a scientific society. Their strident advances may have been due, in large part, to Confucianism, which does not differentiate between the domains of human beings and nature. Instead, the world was conceived as a vast organism in which the five "phases" water, fire, metal, wood, and earth-and the two principal forces, yin and yang, were in constant interaction as they sought their affinities.

In the West, the demand for scientific tools was just as immense, but the ability of science to explain the unexplainable brought with it a special twist - that science was threatening to organised religion. In the pre-Christian era, the science role - definition - limits argument was more rhetorical than factual because most philosophers were also scientists, to mention a few, Aristotle, Plato and Pythagoras. With the advent of Christianity, and its teachings that encompassed all aspects of life, scientists began to feel the constrictions of religion just as their ancestors had felt the lashes of historians, philosophers, and rhetoricians. Governments ruled by religious authority, in most cases the Christian Church, and the restrictions imposed upon freethinking citizens were demonstrative. Christian-based governments believed that if scientists could do as they pleased, who would stop them from entering the realm of God? Would they not soon question
the birth of the world? The beginning of mankind? The creation of the universe? Where would they stop? Scientists might spread vile and ghastly lies about the church in order to undermine the church's power structures. Albert Einstein offered his unique perspective of the situation when he said, "science without religion is lame; religion without science is blind." But Einstein's thoughts came centuries too late to save Galileo from significant disagreements with the Catholic Church and it was those very disagreements that cost him his personal freedom.

Along came Isaac Newton (1642 - 1727). He wanted to create a scientific system that would fit all material events into a framework of relatively simple, and mathematically expressible, rules. In short, he created a "scientific determinism" that gave birth to the scientific method that, in a very real sense, has come to define science. Through a continuation of particular experiments, one can arrive at a universal conclusion, which can then be applied to particular cases. This sounds nice, neat and orderly. Induction and deduction simply determine that in science, the results (universal laws) can be reproduced when the same conditions are met. Mathematical formulas are always verifiable and reproducible. That is the foundation of science. Every time one cools water to below 32 degrees Fahrenheit, it will freeze. At 212 degrees, water will boil at sea level. Predictably. Invariably.

The French Revolution (1789 - 99), triggered, in large part, the dramatic transformation that occurred in scientific and technological education. The new French republican government established technical and engineering colleges, and professors and students were salaried by the state. The Germans were also undertaking similar steps in developing their university system. German universities were designed as pure research centres and eventually became sites of major research laboratories. By 1900, German universities and scientific laboratories had become the best in the world, drawing students from all over Europe, as well as from the United States. Trained personnel now fanned the globe studying various phenomena via scientific means.

It therefore comes as no surprise that science's methodical hands crept into nearby fields and were met with resistance. Gross errors have been made over the last half-century, even by scientists, through transference of scientific terms from their original field of reference. Scientists have argued over the meaning of such words as "evolution", "instinct", "element", and the use of the words "race", "tradition", "heredity", "nationality", and
"value", to give a scientific appearance to non-scientific judgements. The language of scientists has made forays into and created confusion among the scientific, philosophical, and theological use of such terms as "substance", "theory", "idea", "cause", "purpose", and "function". Why? Simply because scientists have neglected language. Yet, they traffic in language and rely on it to give their discoveries meaning. Every language, even computer language, is not fixed, is not inflexible, and is not petrified. Language is the product of complex and ever-changing social conditions and phenomena. Language is created, used, changed, and vitalised by people, and people are at the basis of social phenomena. However, we attempt to describe them using scientific language, which is, by its very definition, immobile.

People, with all our variations and varieties, foibles and syndromes, loves and hates, sins and virtues are the perennial creators of social phenomena, that are as dynamic as their creators. It is this ever-changing pattern of humanity in all of its expressions that seems to move the study of people out of the exacting and reproducible parameters of science. People cannot be classified, divided, and pigeonholed as is the case with many other substances.

People proclaim their uniqueness and individuality in so many forms (from art to religion, law to literature) that each time one, say, a scientist, is tempted to label such an individual expression or to place it within an existing category, one finds that the contents do not fit the prepared mould. So? So one makes a new mould!

**SCIENCE IN RECENT YEARS**

The current classes of newly minted business Ph.D.'s are often taught that science could explain virtually everything. Picture a five year-old child, in the summer of 1969, watching a rocket take men to the moon. There was practically no limit to what imagination, or science, was capable of doing. Although, even with all the money and human resources dedicated to the "moon goal," we were in a very tenuous position. In theory, scientists had worked out all the necessary steps in order to reach the moon and return. The world was pensive both during the blast-off from earth and the lift-off from the moon. It was quite possible that we could have stranded three astronauts on the moon without a way to get home. There they would have frozen to death while a helpless world looked on. After their safe return to earth, science was the hero to the world.
Now step back one year earlier and approach the world through the eyes of an adult in 1968. We could have certainly used the power of science then. But could science have really helped explain the year of "extreme" social phenomena? What could science have done to predict, control or explain the "Tet Offensive," the Prague Spring and the Soviet response, the assassination of Martin Luther King, Jr. and Bobby Kennedy, or the summer riots in the United States at the Democratic convention in Chicago? And yet, we have no problem with using scientific methods to study people's moods, conflicts, attitudes, motivations, goals, satisfaction, performance, and so on.

In academic circles, the boundaries and parameters of the sciences and arts are redefined and redrawn on a regular basis. Liberal Arts, and even Fine Arts, borrow and gladly use scientific tools and language to "load" and "unload" facts, opinions, creations, and analyses. Computer technology is used in literature, and composition classes to teach students better communication skills. Entrance and exit exams are regularly and scientifically administered in such a way that allows the test administrators to view the results from many perspectives including age, gender, race, social, and marital status, that were not examined before when the teacher did not have the tools to go beyond "true or false" responses. It was not too long ago when social studies were replaced by Social Science. Was that a "real" change or simply a phonetic one? What exactly did these social researchers do to earn the lofty title change? What happened to the barriers that divided the "science" majors from the liberal arts majors in college? Who is encroaching on whose turf? It is hard to tell. Science, like our expanding universe, is not confined to a particular subject or area. When Alexander Pope, in his poem "Essay on Man," said, "the best study of mankind is man," he was reflecting on the 17th century fear of inquiry into things outside the ordinary sphere of his society. Basically, he was telling his contemporaries: Do not rock the boat; keep your place; because the King of England says so, and God informed him of his wishes Newton paid no attention to this conformity requirement. Neither did Einstein or Edison. Science moves on, opening new doors and breaking down old ones. Scientific conclusions that were so adamantly defended yesteryear are essentially partial or temporary today. So what does tomorrow hold for the Social Sciences?

SOCIAL PHENOMENA IN A TABLE

Our technological advances are presupposed and grounded into precise ingredients, measurements, conditions, and procedures. Science leaves very
little, if anything, to doubt or to guess. Enter art. From philosophy to literature, from music to painting, art takes in all the erratic, unpredictable, undeniable, emotional elements that science would reject. Art is not used when describing all the elements that exist on this earth. Why? Because scientists have spent an enormous amount of resources and have succeeded in categorising every known substance on earth. Chemists have created a table that summarises the findings. The Periodic Table is a classification and tabulation of the chemical elements that enables systematic explanation and prediction of the elements' chemical and physical properties. In short, definitions of an element's substance could not be decomposed into a simpler substance by any known means. The creation of this table has been possible through the power of science.

These chemical scientists have identified all known natural elements and are now creating other synthetic elements that live for a few moments, which then earn a place on the Periodic Table. For instance, Element 105 has been produced by 3 scientists and generally lives for 30-70 seconds. This is no doubt a major accomplishment in scientific terms, but if science is so vastly powerful, and so many people use it for discovering marketing phenomena, why has not a table of human elements been contrived?

Looking at any standard chemistry book, one might happen upon an equation for the rusting of iron. The equation is as follows:

\[ 4\text{Fe}(s) + 3\text{O}_2(g) = 2\text{Fe}_2\text{O}_3(s) \]

This equation shows that four atoms of solid iron (\(\text{Fe}(s)\)) react with three molecules of oxygen gas (\(\text{O}_2(g)\)) to form two units of solid rust (\(\text{Fe}_2\text{O}_3(s)\)). Repeated experiments demonstrate that iron and oxygen always react in these proportions. Rust is the product, or end result of this reaction, while iron and oxygen are the reactants.

The human elements cannot, at least not yet, be charted on a constant and reliable Periodical Table like the scientific elements. Or so it seems at first. But what about the creation of a Social Periodic Table that may define all social phenomena researched through scientific methods? In Exhibit One each social element that has been identified has been placed in a row and column determined by its "social weight" or "mass" as determined by various researchers, similar to the Periodic Table rules.
If one were to use science to understand, predict, control, explain, etc., social phenomena, the equation derived would be stimulating to say the least. For example, we have our chemistry lab, or in this situation our social lab, with all the social periodic elements on the shelf ready to make something. In this case, we wish to investigate a day in the life of an entrepreneur. Let’s first take one part Innovation (I), mix that with two parts Opportunity (O), apply pressure (i.e., heat) for a while and stir in two parts Angel Investing (AI) and three parts Cash Flow analysis (CF). The equation might look something like:

\[ I_2 + 2O_3 \text{(heat)} \ldots \text{(then add)} 2AI + 3Cf_4 \]

What on earth this formula would contrive is beyond comprehension, yet social researchers conduct such research and then generalise the findings as if they were some constant that would always hold true. If this research example was interpreted as a story, it might go something like this:

Alex, a budding entrepreneur, arrived at his office (garage) in the morning after having a revelation yesterday (one part innovation). It seems Alex has derived a method for preventing people from receiving junk email from unwanted sources. Having talked things over with some other technical and marketing people, it appears this idea has tremendous market appeal with consumers (first part opportunity). Additionally, the very same companies who would be thwarted if this invention were made prevalent want to buy the invention in order to stymie its introduction (second part opportunity).

In order for this innovation to have any hopes of commercial feasibility, Alex will need investment capital that is far beyond his personal means. After approaching twenty-seven different banking and venture capital institutions, he was demoralised and had given up hope of getting his dream funded. During a three-martini lunch, Alex mulled over his problems. If only he could convince someone to take a chance on him and his invention, he knows he could make an incredible return on the investment. At the lunch table next to him was an old friend of his father's who recognised Alex from his carefree boyhood days. When asked what was troubling him, Alex recounted his predicament. It just so happened that this man believed in Alex, his innovation, and was willing to front him the money to get started (one part Angel Investing). Recall, however, having a balanced formula is a requirement in science; thus this angel investor was able to enlist the backing from another acquaintance, and hence the second part of the angel investing equation was located.

In order to make things truly viable, Alex was required by his angel investors to rerun his Cash flow analysis statements with certain changes (first part cash flow analysis). After jumping through what Alex thought were just tedious hoops, the investors made him do it all over again with another set of assumptions. Finally, after seven days of running numbers through his computer, when Alex thought he should be working on the product itself, he was done with the third set of cash flow analysis requirements that his investors wished to see.
### EXHIBIT ONE: SOCIAL PERIODIC TABLE

<table>
<thead>
<tr>
<th>Social Number</th>
<th>Symbol</th>
<th>Construct Name</th>
<th>Market Orientation</th>
<th>Social Weight (or mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Mo</td>
<td></td>
<td>87.122</td>
<td></td>
</tr>
</tbody>
</table>

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What is the outcome of this entrepreneurial science equation? If this were a chemistry equation, any scientist or high school junior could predict the compound that was just created. However, the elements involved here are highly unstable and susceptible to instantaneous change. All chemical elements in the Periodic Table hold a valence. Some have positive valences, for instance, Calcium and Magnesium, while Chlorine and Iodine have negative valences. The vacillating nature of the Social Periodic Table means that each element can hold positively or negatively charged valences, or possibly be neutral. Thus, the social elements, at the drop of a hat, can switch their valence structure with relative ease. Opportunity is a perfect example of an element that can have radical swings with regard to valence. One day a stimulus can represent an opportunity (+), the next day it offers nothing (neutral), or even a negative return (-) if one were to invest resources. Thus, any equation with Opportunity (O) is volatile, irregular, and unsymmetrical, thus making any prediction of the outcome tenuous at best. The same unstableness could be stated for the vast number of entrepreneurial elements in the Social Periodic Table, motivation, job satisfaction, trust, conflict and creativity to name a few. Yet, however fragile the research in Social Science, when compared to the natural sciences, entrepreneurial marketing academicians sally forth in their goal to explain, predict, and control entrepreneurship phenomena.

ENTREPRENEURIAL MARKETING AND SCIENCE MAKE STRANGE BEDFELLOWS

Social phenomena, and particularly entrepreneurial marketing phenomena, are susceptible to the whims of people. Indeed, they are totally generated by people. Thus, how predictable are people? The point is that much of behaviour may not be predictable. Predictability—even if applied within a restricted entrepreneurial area—is a scientific factor. In order to pursue this concept of "predictability", from a marketing perspective, the Marketing Science Institute (MSI) was formed in 1962. Originally funded by 29 corporations and devoted to "fundamental research" in marketing, the institute's goals were:

1. To contribute to the emergence of a more definitive science of marketing.
2. To stimulate increased application of scientific techniques to the understanding and solving of marketing problems.

It is argued that more research has been conducted since MSI inception than in the previous 60 years since marketing broke away from economics and became its own distinct discipline. Buzzell (1963), a MSI past President
remarked, "marketing (and ...human behaviour in general) can never become a science because of its inherent elusiveness. Thus, the search for science is well intentioned but doomed to failure" (p.166). If marketing, or entrepreneurship, are not sciences, although Hunt (1991) purports that certain portions of the marketing domain can be considered a science, why are we studying them like one? Perhaps a more titillating question is, why are so many researchers mesmerised by the attempt to make entrepreneurship a science? Is there anything wrong with considering it an art? Are our brothers and sisters in the natural sciences chuckling at us because we are not considered a "true science"? Or maybe they are snickering because we are expending so much energy while attempting to reach a fruitless and vacuous apex.

If one were to take a highly unscientific survey (i.e., a convenience sample) asking why the term "entrepreneurship" is not spoken in the same breath as chemistry, physics, or biology, what would be the most common response? The answer is obvious! Entrepreneurship is devoid of consistent underlying stability, consistent patterns, and perfect prediction of outcomes. On the other hand, the assumption of stability underlies much of what is known in the physical sciences. For example, Carbon 14 dating is able to predict the age of a substance because disintegration is known to happen at a constant rate relative to time. Thus, the "dating" methods used in geology and archaeology perform with near-perfect accuracy. We cannot make such claims in the "Alex the Entrepreneur" example.

Bartels (1951) had a very qualified opinion on this very issue. He stated, "social phenomena, of which marketing activities are a part, are regarded as not possessing such a high degree of uniformity and, therefore, when studied by the so-called 'objective' methods of the natural sciences, as not providing the highly reliable generalisations with which science has been identified. This claim, of course, is founded largely upon the belief that human behaviour cannot be predicted because people independently 'determine' their actions through reason and impulse" (p.319 - 320).

Therefore, perhaps entrepreneurship, as with marketing, falters in its attempt to be ordained a science for two reasons. First, the objectives of science are not always achieved when studying entrepreneurship there is no codifying central theory which is expressed in testable quantitative terms that allows for prediction and possible control (see Buzzell's 1963 definition noted earlier). Second, the goal of inquiry is to study entrepreneurship phenomena scientifically, without the intent of evolving it into a science. Regarding this
second point, let us imagine for a moment that, by an act of God, entrepreneurship does indeed become a full-fledged science. What then? Will entrepreneurial decisions become routine, with computers grinding out solutions in response to the proper inputs? Will researchers merely pull "social elements" from the laboratory closet, mix them together, and then with confidence and accuracy explain what the outcomes will be? If that were to happen, it is doubtful the entrepreneurship researchers who are in the field today would remain. The allure of wearing little white coats and puttering about the laboratory mixing concoctions with exact outcomes known-how exciting would that be? Since that is not obtainable, why waste cognitive powers on seeking that goal?

Has using scientific methods in the formal and informal study of entrepreneurship helped further entrepreneurship? Certainly it has. Is it the only mode of inquiry that offers understanding and explanation? Clearly not. But it is the overwhelming choice for investigating social phenomena. Buzzell (1963) remarked, "marketing phenomena (and human behaviour in general) differ in kind from those of the physical sciences, so that different methods will have to be employed in studying them" (p. 166). What are these methods, and are they as powerful as the current scientific method?

People generally behave in a logical, rational, linear manner and that is why science can be appropriately used to comprehend human behaviour. Look again at the first part of the statement, "people are logical, rational and linear." We know nothing could be further from the truth. However, we would like to think so, thus our goodness-of-fit index will allow us to use science to study social and entrepreneurial behaviour. Some of the most useful and important lessons in life are based on subjective perceptions ascertained over time. Dale Carnegie (1936) did not use science to study personal and business behaviour. He suggested that the best ways to win friends and influence people is captured through smiling, remembering a person's name, listening intently, talking in terms of other people's interests, appealing to noble motives, and if you are wrong, admitting it. Imagine the addition these concepts could have for those of us who study the interface between two enterprises. Thus, it appears there is hope and a precedent for studying social phenomena without always using science to gain academic approval and societal comprehension.
THOUGHTS ON IMPROVEMENTS

Science is Not a Panacea - Often our brothers and sisters currently researching the "natural sciences" are thought to be offering more pure research as compared to social science. That is to say, that possibly their findings are less open to human interpretation. Thus, researchers must be psychologically comfortable with the notion they have chosen to study complex human organisms that can change instantly. Remember Alex from the social equation offered previously. This changing and unpredictable entrepreneurial behaviour represents the joy, the challenge, and perhaps the main reason why researchers are drawn to this field. While virtually nothing lives in a vacuum, the changing nature of entrepreneurship screams for flexible researchers who are highly concerned with understanding the phenomena and will follow many discovery paths to reach this goal.

Don't Catch Paralysis by Data Analysis - Several years ago; an airliner collided with another plane on a clear day, resulting in a crash that killed all aboard. A reporter asked the FAA investigator, "how is it possible that a plane with the most modern monitoring and navigational devices, flown by a very knowledgeable and skilful crew, could find itself in such a disastrous situation?" The FAA investigator looked up and replied, "sometimes they need to look out the window." On occasion, entrepreneurial marketing researchers need to look out the window and question the notion that crunching numbers using regression, logit analysis, or neural networks will yield the "Truth." Use the tool that best helps answer the research question. If it is appropriate to use LISREL, then do it. However, it may be more appropriate to capture and interpret the phenomena in a case study.

Go To See the Patient In-Person - The beauty of a "titration" (a process to accurately measure intensity levels and reactions) is that one minuscule drop of liquid can be added to the equation in a tightly controlled manner; that is not possible when dealing with entrepreneurs no matter what the researcher's resolve or equipment. It is difficult, basically impossible, to isolate the entrepreneurial phenomena under study through experimental design. A predominant number of studies have been produced with mailings of self-report questionnaires that, while good, are not the sole means to collect data. The field needs to take off the white lab coats and get hands dirty where the action occurs. A conservative estimate might state that four out of five entrepreneurs would assist academic research interests, a few would not due to time or confidentiality reasons. The entrepreneurial field is laden with individuals who do and will continue to support academic inquiry in their business, behaviours, and cognition.
CONCLUSIONS

Is science an appropriate mode of inquiry for investigating social phenomena and entrepreneurship? Well, the idea that science can create a Social Periodic Table is ludicrous, if not delusional. Perhaps entrepreneurship, marketing, and other social sciences study words. Words are what shape our reality on a daily basis. If that were indeed true, why would anyone think that science would be the tool of choice in order to explore this phenomenon?

"Marketing, like any 'subject that is taught,' may be taught (and researched) in a variety of ways with widely differing emphasis and integration" (Bartels 1951). Yes, studying certain phenomena through scientific means has placed a few countries, and companies, in the forefront of space exploration, medical technology, chemistry compounds and physics findings, to mention just a few areas. Can the same be said for social studies? Perhaps, since observed behaviour in entrepreneurship and social phenomena is influenced by many variables, it is very difficult to isolate the effect of any one or any small combination of variables. Again, science needs this constant in order to be accurate and provide us with lawlike generalisations, but social invariants are about as common as world peace.

The idea of entrepreneurship (research or existence) being part of a Social Period Table, whereby a scientist, or high school student, could sprinkle in some elements and predict with any certainly the outcome, while delightful, is far from reality. Science can indeed be one mode of inquiry for investigating all phenomena, natural and social, physical and human, mental and financial, industrial and commercial. Science has become a tool rather than an end in itself. All we need to do is to learn how to use that tool and when to apply it.

REFERENCES


