
Sustainability in the University Curriculum: Teaching Introductory Economics

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Abstract

Economics is the study of human behavior in relation to a resource-constrained world. The discipline is a *behavioral* science. From this perspective, economics incorporates the evaluation of both individual and societal behavior within the context of prevailing cultural values to assess resource use, constraints and sustainability relative to *anthropomorphic* or human-focused resource utilization. However, many cultural values can be described as legacy, defined as an inheritance from a previous generation. Additionally and related, unless there is a continuous assessment and reassessment of and between social actions and societal frameworks, there can be a delay in the needed responsiveness to modify cultural values. The latter statement addresses the need for promoting awareness of the parameters that define sustainable consumption. This paper explores one example of how increasing awareness of the assumptions embedded within supply and demand, as overtly visible in “fair” market prices, can increase awareness of the inherent responsibility of consumption decisions. Using a replicable life cycle cost assessment assignment, the author provides a rationale and outcome for the incorporation of a sustainability project in the teaching of introductory economics.

Keywords

Education · Economics · Life cycle analysis · Sustainability · Consumption

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1 Introduction

By definition the concept of sustainability incorporates the intertemporal allocation of resources through a holistically assessed strategic utilization rate that includes environmental and social justice parameters. From the Brundtland Report (WCED 1987):

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- The concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and
- The idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs. (p. 43)

Economics plays a significant role in the establishment of sustainable development. However, in viewing production and consumption from the perspective of supply, demand and market price, the assumptions related to consumer behavior theoretically enable sustainable outcomes to the extent that consumers are aware of the inherent responsibility of their consumption and are knowledgeable with respect to the impact of consumption on both the environment and social welfare.

In the United States, consumption contributes to over 65 % of gross domestic product (GDP), which since the 1940s has been the international metric for economic progress. Given this linkage and the corresponding focus on GDP growth as a proxy for progress, consumption decisions can have a significant ripple effect throughout a single economy and ultimately the finite global resource base, making consumption-led growth a potential limiting factor to sustainable development. Consider for example the use of milk cartons.

Lined, printed-paper cartons were created for the transport and preservation of beverages from the production to the consumption stage. However, the components of the carton were not developed with waste disposal in mind, rather increasing distribution, shelf life and ultimately sales were the rationale for the carton. As a result, largely due to the basis of its creation, the paper beverage carton serves a consumption purpose, consideration of the impact to the environment and potential future human and animal health as it relates to its composition and waste has largely been an after thought until the present period. This illustration on a broader consumption scale provides a simplified perspective to evaluate the underlying values captured in consumption decisions. From this perspective, production for consumption may be expressed as a myopic activity, focused on near-term satiation of a need or want to the exclusion of the evaluation of the impact or ripple effect of the satiation.

The values embedded and communicated within demand and supply, determine the manner in which a need or want is attained. To the extent that there is no discussion of the values and behavioral factors assumed and reflected in demand and supply, arguably, implicit values, the values and the subsequent behaviors become endogenous to the economic system. From this perspective, explicit

awareness of present behavioral assumptions inclusive of the “unlimited wants” of consumers, profit maximization motivations of producers, and the understated resource depletion resulting from externalized or under enumerated costs, offer the potential to modify active and embedded behavior.

In this paper, the author addresses how the teaching of introductory economics can raise awareness of the significance of consumption behavior as the activity relates to sustainability, where the definition of sustainability is adopted from the United States Environmental Protection Agency (EPA) (n.d.): “Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations.” Following a brief review the present state of introductory economics instruction, the case is made and an example provided of how integration of sustainability as a value embedded within the consumption discussion can influence economic outcomes as these relate to the inter-temporal allocation of resources consistent with the EPA’s definition of sustainability. The discussion and example are specific to a single case study involving the instruction of Principles of Microeconomics; however, the methods used are replicable across disciplines.

2 The Present State of Introductory Economics Instruction

Introductory economics is typically comprised of Principles of Microeconomics and Principles of Macroeconomics. The former course focuses on the rationale for decision-making behavior on the part of the consumer and the firm. The latter focuses on the aggregate factors that define economic progress as this concept relates to the “standard” expenditure-based variable of quantifying growth, gross domestic product (GDP). Both courses incorporate elements of Microeconomics to establish the foundation for the assumptions of individual and firm behavior where such behavior is guided by a “rational” agent assumption and the underlying premise of rational decision-making is defined as maximizing return while minimizing cost. The explicit discussion of the embedded assumptions guiding the behavior of the decision-maker is usually not a part of the teaching process. Typically as noted by Knoedler and Underwood (2003), that the assumption of insatiable want may be a taught and learned behavior, which is reinforced through the economic market model is not even addressed in economics. Additionally, alternative scenarios where satiation can be attained without maximization of consumption are not addressed. Nelson (1995) states, “The possibility that consumption should be reduced because the act of consumption is not good for the soul, or is not what actually makes people happy, has no place within the economic value system.” As a result, to the extent that individual economic agents, producers or consumers of a good or service, are bounded by rationality that does not include addressing the impact of externalized (i.e. non-quantified costs) the economic discussion does not

promote or position the assessment of alternative outcomes (Daly 1996, 2014; Dietz and O'Neill 2013). Implicitly and endogenously, the economic discussion establishes and maintains consumption to production circular flow, focusing on the gratification of consumption and profit taking from production, seemingly eliminating responsibility and assessment of externalities and holistic dynamics as a part of the cycle.

Returning to the beverage carton example, the economic discussion would be limited to the utility gained from consuming the beverage and the corresponding profit maximization of the producer. Waste would be regarded as an externality rather than an endogenous aspect of the decision making process. Additionally, production costs would be assumed to be priced into the product, through efficient market assumptions, to yield a fair market price that embodies the totality of the product life cycle cost (i.e. from the point of extraction to production distribution, consumption and waste). In net consumers would expect that the purchase price is indicative of the holistic cost of the product and producers would view production costs as being related to the market price of inputs not environmental impacts during or as part of the life cycle of the good. However, the assumption of the fairness of the market price would only be able to be evidenced in real terms if consumers were aware of the production process and policed the preference for the inclusion of externalities in demand, which is inconsistent with the present reality. As Nelson (1995) notes, the factors that are included in an economic evaluation are limited to the tangible quantifiable costs and costs are overlooked where either a market or regulatory oversight has not provided a monetary justification. From this perspective, the market mechanism disenfranchises the consumer from the welfare of those impacted by his/her consumption and promotes the perception that price alone is indicative of the true cost of a good.

3 Establishing a Foundation for the Incorporation of Sustainability in Introductory Economics

The failure in present market mechanisms as they relate to the outcome and promotion of sustainable development may be directly attributed to the cultural values that are embedded within consumer demand and producer supply. The significance of this affirmation rests in the potential for education to promote augmentation of cultural values to be consistent with sustainable outcomes. In essence, teaching sustainability requires guidance in adopting cultural changes, including social and lifestyle changes, necessary to achieve sustainability via sustainable economic development as noted by UNESCO (2000):

Culture shapes the way we see the world. It therefore has the capacity to bring about the change of attitudes needed to ensure peace and sustainable development which, we know, form the only possible way forward for life on planet Earth. Today, that goal is still a long way off. A global crisis faces humanity at the dawn of the 21st century, marked by

increasing poverty in our asymmetrical world, environmental degradation and short sightedness in policy-making. Culture is a crucial key to solving this crisis. (p. Preface).

A discussion related to the role of culture in fostering sustainability within higher education, provides context for an assignment, which is the focus of this paper, related to the integration of sustainability values within the Principles of Microeconomics curriculum. The assignment promotes an explicit understanding of consumerism and economic growth within the context of implicit values depicted in market pricing for goods and services. Further the assignment provides a foundation to students in how the implicit delegation of consumer responsibilities for responsible consumption have fostered the degradation, exploitation and depletion of global resources yielding the unsustainable outcomes presently observable. The assignment as has been deployed, engages students to realize the significance of market price on unsustainable consumption in conjunction with the power of consumer demand to foster and establish a sustainable future.

However, to facilitate the introductory background for the assignment, students are expected to be familiar with the following foundational economic concepts:

- Definition of economics;
- Definitions of supply and demand; law of supply; law of demand and embedded assumptions in supply and demand curves;
- Historic evolution of gross domestic product (GDP) from production capacity measure to an indicator of global economic progress;
- Definition of the expenditure equation of GDP;
- Assumptions of consumer and firm (i.e. business or producer) behavior;
- Assumption of equilibrium market price related to price accuracy and the cost of products and services;
- Potential for market prices to under-remunerate true costs and thereby allow for unsustainable consumption;
- Definition of externality and how externalizing of costs facilitates unsustainable consumption.

Additionally, students should be aware of the three assumptions embedded in the classical definitions of consumer, firm and market behavior: (1) “unlimited wants” on the part of the consumer, (2) market price efficiency, which is the implied view that market price at equilibrium adequately assesses production and consumption costs, and (3) producer motivation to minimize costs and maximize revenue (profit), in part by maximizing externalities, often with unsustainable outcomes. A key issue and focal point of the assignment is how externalities relate to the price of a good or service, whereby non-quantified costs (i.e., externalities) essentially subsidize (i.e., reduce) the market price, and thereby promote unsustainable resource utilization rates (Hards 2011; Fischer et al. 2012; Sen 2010; and Venkatesan 2015). In conjunction with the aforementioned concepts and the arguable endogeneity of the assumptions, an inclusion of the historical perspective of the classical principles is advocated for inclusion, to provide a contextual representation of the anachronistic capacity of the present state of the teaching of the principles of economics (Venkatesan 2015).

Evaluating the historical cultural progression of human society can promote a stronger understanding of the economic relationship with resource allocation, both intra- and inter- society, and most importantly provide insights with respect to how perceptions of the world are shaped through cultural frameworks at a given point in time. The pace at which cultural attributes evolve may also provide a deeper understanding of why institutional and social frameworks may be inconsistent with the manifestation of contemporary challenges.

4 Incorporating Sustainability Culture in Higher Education, Class by Class

Many educational institutions have started to integrate or create stand alone sustainability programs. Specific to the intent of the inclusion of sustainability, it would appear that the primary channel for promoting viable sustainability initiatives would include a holistic sustainability curriculum along with inclusion of institutionalized sustainability. There are many methods of establishing sustainability initiatives on a campus-wide basis and these can include formation of an oversight function for facilities and institutional integration related to a defined Sustainability Mission Statement via the creation of a Director of Sustainability to establishment and funding of student-led Green Teams charged with developing and deploying initiatives targeted at the student body. However, institutionalization, though advocated, is beyond the scope of the present discussion and is only presented here from the perspective of establishing a self-reinforcing culture that supports the curriculum in which sustainability values are implicitly incorporated and explicitly addressed. Further given that this paper addresses the incorporation of sustainability from a single course perspective, the inclusion of remarks related to a holistic deployment of sustainability serve to acknowledge the need for an overarching sustainability strategy. Having a stand alone program without a holistic support framework within the institution challenges the adoption of sustainability as an individual pursuit, while incorporating sustainability within the operational structure of an institution establishes a cultural value.

Consistent with the scope of this paper, development of a sustainability curriculum that incorporates cultural values is advocated on a discipline-by-discipline basis given each discipline's unique intersection with sustainability values. For example, the inclusion of sustainability within philosophy could include the transformation of moral philosophy as it relates to economic practices and intrinsic value of living resources, while the inclusion of sustainability in economics could incorporate an evaluation of the "fairness" of trade, the impact of the non-capture of externalities in pricing, and the assumptions of consumer insatiability. Creating curriculum where the value of and for sustainable outcomes is both implicit and explicitly compared to current practices will promote stronger awareness and the reinforcement of sustainable values across a student's course load. In turn this will promote a favorable environment for individual awareness and change, leading

hopefully, to the potential for a coalescing of individuals to establish a cultural practice of campus sustainability. The inclusion of which could then either further enable institutional objectives or be a catalyst for the creation of the same.

5 Principles of Microeconomics: Sustainability Integration Case Study

As part of a semester long Principles of Microeconomics course, students were introduced to the economic concepts of supply and demand and the implicit assumptions embedded in each: the profit motivations of producers (supply) and the insatiable wants of consumers (demand). Included in the discussion were the characteristics that define supply and demand, such as, preferences and income on the part of the consumer, and resource access and production capacity on the part of the producer. In addition, students were familiarized with the concepts of *marketed demand* and the culture of *consumerism* which defines the U.S. economy to increase their conscious awareness that consumption decisions may not reflect need or even wants but manufactured wants stemming from marketing, advertising, and the media or cultural values that promote consumption as a leisure activity.

Specific to the assumption of consumer insatiability, through a discussion of the role of consumerism as part of a cultural foundation for consumption choices, students became explicitly acquainted with the values embedded in the exercising of demand and supply, the influence of marketing and advertising on demand, as well as, the potential inconsistency between producer incentives and consumer values as they may relate to sustainability. The guided discussion of these concepts promoted student engagement in self-evaluation of consumption decisions; assessment of the sustainability of consumption decisions; and promotion of the importance of consumer behavior in establishing sustainable consumption. The goal of this activity was to increase awareness of the implicit values promoted through present consumption behavior within the broader context of a consumerism-based culture. With a foundational understanding of the basis of individual consumption behavior, students were then challenged to evaluate and exercise the responsibility inherent in their consumption decisions within the context of the role of cultural influence.

5.1 Life Cycle Assessment Assignment

The life cycle assessment assignment was introduced following foundational understanding in economic theory and corresponding behavioral assumptions. The assignment's goal was to provide students with an opportunity to tangibly assess whether or not the market price of a beverage they routinely consumed represented a sustainable price or instead represented a net price after allocation of externalities to other societies and the environment. Students picked beverages from Red Bull to milk. The learning outcomes (LO) of the assignment were stated on the assignment

and included in the syllabus description of the project. The learning outcomes included:

LO1: Recognize externalities incurred in the production of a product and relate these to the price paid for the product.

LO2: Question the sustainability of consumption choices through a life cycle evaluation of the costs of production, distribution, consumption and waste.

LO3: Explain the consumer's role in promoting a sustainable economic outcome.

LO4: Articulate potential inconsistencies between consumer and producer incentives.

The assignment, which was distributed with the course syllabus and was scheduled to be addressed mid-semester, explicitly engaged students in an analysis of their own consumption motivations (i.e. need, want, marketed demand, etc.) in conjunction with explicit evaluation of the sustainability of a specific consumption choice. The assignment was carried out through a qualitative assessment of the life cycle costs of a purchased good and by definition, evaluated environmental and social costs from production to waste. Students were expected to assess the qualitative life cycle cost in relation to the market price of the good to then determine if the price paid reflected subsidization by the environment and society. The assignment entailed three parts: outside class research and qualitative assessment of the environmental, social and health impact of the beverage; in class discussion of individual student findings—two weeks after assignment distribution; and a reflection paper, which addressed questions specific to the set learning outcome objectives:

- Does the market price reflect the cost of producing your beverage? (LO1)
- Has this activity modified how you will make consumption decisions in the future? (LO2)
- How can consumers impact sustainability? (LO3)
- Do consumers implicitly assume that producers are factoring sustainable values? Why or why not? (LO3, LO4)
- Which do you view as the most significant attribute to consumption: supply, demand, or price? Why? (LO4)

The life cycle assessment included addressing the life cycle impact of the beverage container as well as the environmental, social and health impact of the beverage. Given the duration and introductory nature of this assignment as well as the assignment's occurrence within an introductory economics course, student evaluation of the life cycle impact was limited to the health impact, water footprint and carbon footprint and students were provided with an Assessment Table to assist in facilitating their qualitative assessment of these factors (see Appendix A). Specific to the introduction of the life cycle of the beverage container, discussion centered on production costs (i.e. use of petroleum in production of plastic bottles) and then the impact of the disposal of the beverage container on the land and oceanic environments, culminating with the impact back to human health (i.e. impact to aquatic life harvested for food production).

The assessment of the environmental impact of the beverage entailed an evaluation of the ingredients in the beverage product, focusing on the assessment of potential adverse and beneficial health impacts, relative to water. This step was fostered by providing students with resources available from the United States Department of Agriculture (n.d.) where students were able either enter the name of their beverage or the beverage ingredient list to evaluate the nutritional benefit both singularly and relative to water.

The water footprint of the beverage was then assessed through the information and research available from public sources, including but not limited to independent research organizations and the beverage producer. This process introduced students to the fact that a water footprint not only includes the water in the beverage but also the water used to grow ingredients ultimately used in the production of the beverage, as well as, impact to water related to use of pesticides and herbicides in the production of the beverage ingredients.

Students also assessed the carbon dioxide footprint of their chosen beverage. This is an area where students made direct assumptions with respect to distance and use of transportation.

As in the case of all the assessments and as stated earlier, given the short duration of the assignment, students were not expected to quantify the health and environmental costs but instead used qualitative evaluation based on their research to assess the adverse impact related to the three areas of assessment: health impact, water footprint and carbon footprint. Two weeks following the distribution of the assignment, individual research and qualitative assessments were shared in class, along with resources discovered by the student as a means of fostering peer-to-peer learning while also enhancing student resources. Following the sharing and discussion of resources and assessments, students were expected to provide a written description of their life cycle assessment, via a reflection paper.

The reflection paper was directed through the use of questions, as provided above, which directly tied to the assignment's learning objectives and as a result, provided students with the ability to evaluate their own decision-making pre- and post- assignment specific to their chosen beverage. In answering the questions specified for the reflection paper students were prompted to use the outcome of their assessment including a review of their research process and their qualitative assessment of environmental factors to explain how they ultimately decided on the justification of the price of their beverage relative to the market price. Students were required to include their Assessment Table (see Appendix A) with the submission of their reflection paper.

5.2 Reflection Paper Perspectives

The reflection paper was limited to a length of three to five pages and students were directed to use APA style to format their documents, including citations and references. Additionally grading was dependent, as noted in the assignment rubric (see

Appendix B), on the quality of a student's response to the questions accompanying the life cycle project. The quality of response was assessed by the strength of the narrative construction, the evaluation process related to the question addressed, and the research detailed in the student response.

From the student responses and as these relate to forming a culture of sustainability, the outcome of the assignment appeared to increase overall student awareness of externalities involved in their consumption decisions. Out of 62 students participating in the assignment, all noted that they had gained greater awareness and 75 % noted an anticipated change in the consumption decisions as a result of the assignment. Student reflections included commentaries relaying specifics with respect to responsible consumption and their individual role in permeating the value. One student, who evaluated the impact of soda consumption noted, "While this assignment has not changed my behavior and choices, it has definitely increased my awareness of the true costs that go into each can, and I will be more mindful going forward." While another student who focused on the impact of price in consumption choices stated, "Before this assignment, while somewhat reserved in certain products for the most part I bought impulsively. Not thinking about what I was actually contributing to, that being the exhausting of the planets resources as well as my own health and the environment's health as a whole. After learning all of this information I plan on really putting in a committed effort to know not only what I'm buying, but what I'm buying into." Another student reflected:

The way I made consumption decisions prior to Micro and Macroeconomics were careless and unknowing, like most of today's citizens in America. I bought a 1995 Toyota 4 runner instead of an eco-friendly car because I just wanted an SUV. Making the decision of owning a vehicle that chugs gasoline constantly was a consumption decision I was not aware affected anything other than myself. Now, I still want an SUV, but there are many hybrid models that I will consciously look for now that I know how much one person can affect the entire world, and hopefully by teaching the people around me of the same values, I can make at least a small change in our world's future.

6 Concluding Comments

The life cycle assignment as described, provided students with an ability to evaluate economic assumptions with respect to the relationship between assumptions and the prevailing economic framework, as well as the significance of consumption via a culture of consumerism with respect to resulting economic outcomes. An important component of the exercise was in establishing the relationship between individual consumption decisions and sustainable outcomes, essentially introducing to students the responsibility inherent in consumption. Though the outcomes as provided in student reflection papers were mixed with respect to the degree by which the increased awareness would augment present consumption patterns, all students recognized they had an ability to contribute to sustainable outcomes and all students

stated that they would be more conscious of their consumption choices and their impact on the sustainability of the planet.

The assignment was designed with an expectation of making the course material more relevant to student interests by challenging assumptions of behavior to increase student critical thinking and thereby evolve individual assessment of values. The outcome of the class promoted the anticipated awareness and from the perspective of course objectives and assignment leanings outcome was a success. However, given the single course focus on sustainability relative to the entirety of a collegiate degree program, the traction of the awareness of students may be short-lived rather than habit forming. From this perspective, it is highly recommended that collegiate institutions adopt sustainability values within at minimum all core or required course work to ensure that students are at minimum being engaged in more than one classroom setting. In addition, it is recommended that institutions incorporate active facilities-based sustainability practices such that sustainability automatically is fostered as a campus cultural behavior.

As noted by UNESCO (2000) and evident in the historical progression of global consumerism, culture plays a significant role in fostering and maintaining sustainability. However, the education of the importance and significance of culture needs to be updated and routinely communicated to ensure the maintenance of sustainable practices.

6.1 Economics as a Catalyst

The present global status of recognized environmental degradation, exploitation and resource depletion tied to understating of resource costs and ultimately the pursuit of a narrowly defined consumption-based metric of economic progress, gross domestic product, has promoted an increased multidisciplinary interest in sustainability. By definition the concept of sustainability incorporates the intertemporal allocation of resources through a holistically assessed strategic utilization rate that includes environmental and social justice parameters. The curriculum exercise shared in this paper provides a significant step forward with respect to the explicit introduction of sustainability into Principles of Microeconomics curriculum. The results obtained are consistent with expectations and promote the creation of sustainable rational agent behavior.

The defining of sustainability is in close alignment with the objective of the discipline of economics. Economics is the study of human behavior in relation to a resource-constrained world. The ability of economics to add value to sustainability objectives requires the insertion of value parameter or normative thinking in conjunction with the positive or observational stance adopted by the discipline. The catalyst for the value based practice of economic rests with the ability to promote an understanding of the discipline, establish pervasive rational agent behavior in the economy and promote attainment of optimal social and environmental outcomes rather than observationally recording the realization of the theory of second best.

The assignment provided in this paper aligns with the ability of economics to provide a tangible student connection to the role, importance and significance of sustainable consumption; however, the life cycle approach is replicable across other disciplines as various components of the assignment can be stressed to promote an understanding of the interdisciplinary nature of sustainability. In a natural science course, for example, the externalities assessment could be broadened to more deeply explore the environmental footprint of production on both human and ecosystem health.

Though the case study provided here focused on a limited number of students within a requirement-fulfilling introductory course in the discipline of economics, the awareness that the assignment promoted should not be diminished. What was made evident through the assignment was that exercises, which promote tangibility to sustainability, can foster an understanding of the role of culture (values) to ultimately promote modification of behavior in favor of sustainable outcomes.

Appendix A: Assessment Table

Students are requested to populate the table below using a scale of 1 (minimal) to 3 (significant) where scoring is based on justifiable evaluation of the impact of the beverage on the stated category and impact grouping. For example, if the beverage uses 10 gallons of water in the production of an ounce, you may view this as a 3 for the category production and impact grouping water footprint. The table will be used in the in-class group discussion and should be attached to the student reflection essay.

| Good: beverage—cola/soda | Water footprint | Carbon footprint | Human health impact | Natural resource impact |
|--|-----------------|------------------|---------------------|-------------------------|
| Production | | | | |
| Distribution detail impacts specific to the distribution of the final good | | | | |
| Consumption detail impacts from the point of consumer purchase to disposal | | | | |
| Disposal detail impacts from the point of waste disposal; waste incineration or landfill; impact of packaging disposal-impact of recycling | | | | |

Appendix B: Assignment Learning Outcomes—Instructor Evaluation

The rubric provided below is to be used in evaluating the student reflection essay. All categories are tied to the stated learning outcomes of the assignment.

| Learning outcome | Excellent score: 4 | Good score: 3 | Average score: 2 | Poor score: 1 |
|--|--------------------|---------------|------------------|---------------|
| Recognize externalities incurred in the production of a product and relate these to the price paid for the product | | | | |
| Question the sustainability of consumption choices through a life cycle evaluation that includes production, distribution, consumption and waste | | | | |
| Explain the consumer's role in promoting a sustainable economic outcome | | | | |
| Articulate the potential for inconsistency between incentives for the producer relative to the consumer | | | | |

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