



The Critique of the Theory of Transportation System Users' Hierarchy of Needs

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ABSTRACT

This article analyzes the philosophical and economic definitions of ends and means and the close relationship between ends and means. Based on this analysis, we believe that human wants and needs belong to the category of the end from the perspective of philosophy, and transportation belongs to the category of means from the perspective of philosophy. In the context of economics, the means represent resources, the ends represent the human needs or want. In the philosophical sense, end belongs to the category of intrinsic value, and means belongs to the category of instrumental value. Therefore, ends belong to the subjective category, and means belong to the objective category. In the consumer behavior theory of economics, the nature of human wants/needs is unlimited; different wants/needs have different degrees of intensity; human wants/needs tend to be competitive, due to the limited resources. Due to the above nature of human wants/needs, human wants/needs can be divided into Maslow's hierarchy of needs, and due to means belonging to the objective category, resources/means can't be divided hierarchically modeled Maslow's hierarchy of needs. Transportation belongs to the category of means/resources, so the theory of Transportation System Users' Hierarchy of Needs is inappropriate. We further pointed out that the creators and proponents of the theory of transportation system users' hierarchy of needs did not provide a sufficiently strong argument for the rationality of this theory to further strengthens our view, i.e., the theory of Transportation System Users' Hierarchy of Needs is inappropriate.

KEYWORDS: end, means, human wants, transportation, hierarchy.

1. Introduction

Abraham Maslow divided the needs of human beings hierarchically into five levels at the beginning of his career and six levels during his later years: (a) physiological, (b) safety, (c) social belonging, (d) esteem, (e) self-actualization, and (f) self-transcendence.¹

Modeled after Maslow's division method, Winters, Cleland, Mierzejewski, and Tucker (2001) divide the transportation needs hierarchically as the transportation system users' hierarchy of needs, i.e., the first layer is safety and security; the second layer is about time, which means timesaving and trip efficiency; the third layer is societal acceptance; the fourth layer is cost, and the fifth layer is comfort and convenience.

Since Winters, et al. proposed the theory of the transportation system users' hierarchy of needs in 2001, the

influence of this theory is far less than Maslow's hierarchy of needs theory. We think this division method of transportation system users' hierarchy of needs modeled after Maslow's division method is flawed, then, this paper intends to critique the theory of transportation system users' hierarchy of needs.

2. Literature Review

Neveu, et al. (1979) use perceptual mapping techniques to analyze the influence of the three factors, as comfort, convenience, and reliability about the commute. Koppelman and Pas (1980) disclose a generally very positive attitude toward car mode, a less positive attitude toward walking mode, and a neutral attitude toward bus mode. Also, they find that there has a high degree of sensitivity toward the major increase in gas prices, and little sensitivity toward lower bus fares. Mitchelson and Gauthier (1980) find that psychological and situational variables will affect the travel mode choice greatly. Ulberg (1989) argues that values, beliefs, and psychological factors will affect the choice of mode.

¹ https://en.wikipedia.org/wiki/Maslow%27s_hierarchy_of_needs
<https://ijbassnet.com/>

Winters, Cleland, Mierzejewski, and Tucker (2001) divide the transportation needs hierarchically after Maslow's hierarchy of needs as the transportation system users' hierarchy of needs.

The block diagram of the transportation system users' hierarchy of needs is as follows:

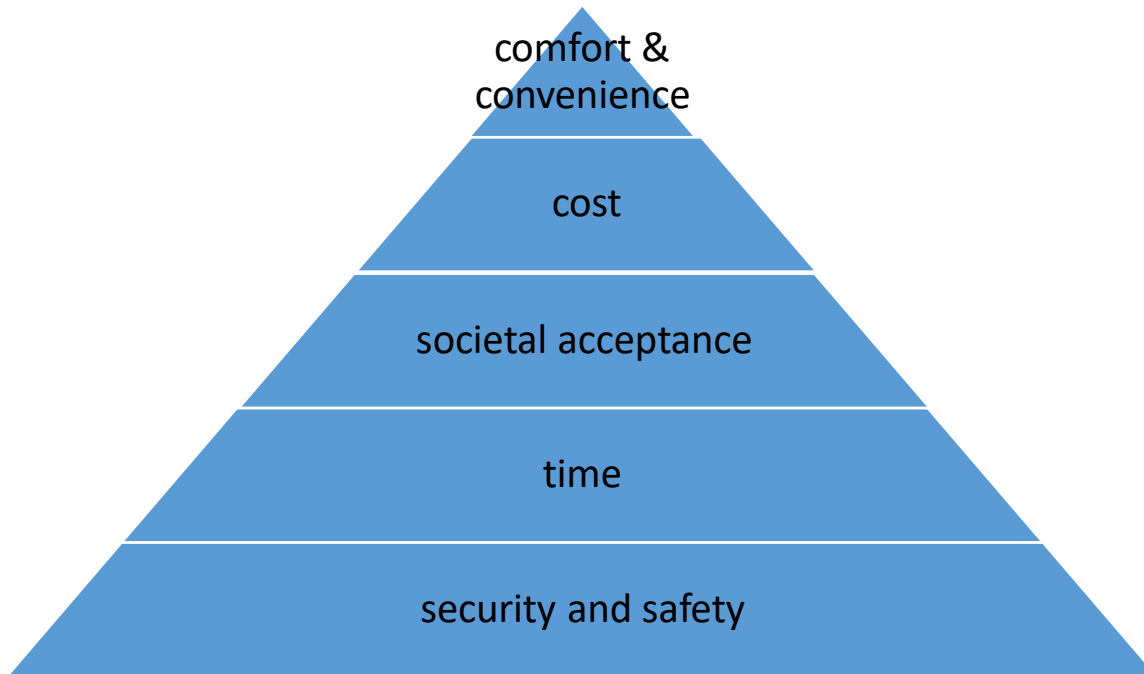


Figure 1 transportation hierarchy of needs Cited from Winters, etc. 2001, p37

The first layer is personal security and safety which is the most basic needs. The second layer is about time, which means timesaving and trip efficiency. Driving too much is not good for health: "The more time people spend driving, the greater their odds of having poor health and risk factors for poor health"². According to TIME³, a commute negatively affects the body in 10 ways: raising blood sugar level, raising cholesterol level, raising the risk of depression, increasing anxiety, decreasing happiness and life satisfaction, temporarily spiking blood pressure, raising blood pressure over time, decreasing cardiovascular fitness, impacting sleep patterns, causing back problems.

Perone, et al. (2005) is the most prominent proponents of the theory of transportation system users' hierarchy of needs, the primary focus of their research project "was in providing empirical evidence of a Hierarchy of Transportation Needs" (Perone, et al., 2005, Abstract).

Cheu and Kreinovich (2007) demonstrated that commute disutility functions, i.e., describing the relationship between disutility and commute time, present an exponential function form, and are not only consistent with common sense but also can simplify the computation.

The fact that the construction workers have to take endured travel times is supported by survey data. Priceonomics company⁴ computed the average commute time by occupational category based on data from the 2014 American Community Survey.

The calculation results show that professions in the construction and mining industry have the longest commutes. Specific results are shown in Table 1.

Cervero (1989) finds that metropolitan areas in the United States had already exhibited the phenomenon of the widening gulf between the Americans' living place and working place. Although there had been a steady migration of jobs to the suburbs, many suburban residents began to commute farther than ever. Cervero (1989,1996) analyzes the factors associated with this phenomenon and argued that job-housing imbalances would affect levels of regional mobility and travel behavior. Levinson (1998) argues that residence in job-rich areas is associated with shorter commutes, as is having workplaces in housing-rich areas.

Green (1999) argues that many rural residents have longer than average commute times because most rural areas lack specialized, highly-skilled, and nonmanual jobs, and as a result, individuals are forced to seek employment in larger labor markets,

² www.sbs.com.au/news/too-much-driving-is-bad-for-you-study

³ <http://time.com/9912/10-things-your-commute-does-to-your-body/>
<https://ijbassnet.com/>

⁴ www.priceonomics.com/

<http://dx.doi.org/10.33642/ijbass.v6n8p2>



However, they still prefer to reside in areas that are less expensive or provide rural/small-town ideals.

Axisa, Scott, and Newbold (2012) established multiple linear regression models using data drawn from the 2006

Census of Canada Master File to examine factors that influence commute distance within the commuter shed of Toronto, Canada.

Table 1: Average Commute Time by Occupation Type

Rank	Occupation Group	Commute in Minutes
1	Construction and mining	33.4
2	Computer science and math	31.8
3	Business operations specialists	30.2
4	Architecture and engineering	30.2
5	Finance	29.4
6	Lawyer and legal support	28.9
7	Physical and social science	28.8
8	Arts, design, entertainment, sports, and media	28.6
9	Protective service (police, firefighter, etc.)	28.4
10	Management	28.0
11	Installation, maintenance, and repair	27.7
12	Transportation	27.2
13	Healthcare practitioners	26.2
14	Administrative support	26.0
15	Industrial production	25.8
16	Cleaning and maintenance	25.7
17	Sales	25.4
18	Healthcare support	25.3
19	Social service	24.9
20	Farming, fishing, and forestry	24.6
21	Personal care and appearance	23.6
22	Education	23.1
23	Food preparation and serving	22.0
24	Military specific	21.0

Cited from <https://priceconomics.com/which-professions-have-the-longest-commutes/>

3. The Nature of Philosophy and Economics of Human Needs and Transportation

3.1 The definition of end and means

Usually, the means are the methods that you use, and the end is the goals or the final results. Kant said: “Act in such a way that you treat humanity, whether in your person or the person of any other, never merely as a means, but always at the same time as an end.”⁵ Kant means that we are humans who have value in itself, then we should respect each other as a rational person with our maxims.

Cf. Oxford English Dictionary and some philosophers⁶ give the following meaning of the expression of end and means:

The term-end indicates “1. the intended purpose of an action that we have set ourselves, and that we pursue, because

we want to attain it, and which we will accomplish in the successful case, 2. end in the sense of a purpose or a function which a thing or a person fulfills or is designed for, and 3. end in the sense of the purpose things or people, fulfilling a purpose in the second sense, are used for; for instance in phrases as ‘for physical training’, ‘for resale’, and ‘to remain in power’ ”.(Löhrer, 2005, p. 6).

The term means indicates “1. actions or modes of action which can be performed by an agent himself because they are within his reach of power and which seem apt to contribute to achieving ends of the kind mentioned under (1) above, 2. instruments, things or persons which are usually used for doing so, 3. economical means, funds and pecuniary resources which do not show an immediate relationship to a certain goal of an action ”.(Löhrer, 2005, p6).

In the context of economics, the means represent resources, the ends represent the human needs or want. In the field of economics, what is generally accepted is the

⁵ https://link.springer.com/chapter/10.1007/978-94-009-4345-2_6

⁶ <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.565.5076&rep=rep1&type=pdf>



economics definition of Lionel Robbins? "Economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses." (Robbins, 1935, pp. 15) "Economics is not about certain kinds of behavior," but "a certain aspect of behavior, the form imposed by the influence of scarcity." (Robbins, 1935, pp. 16–17). "Economics is entirely neutral between ends; ... in so far as any end is dependent on scarce means, " (Robbins, 1935, pp. 24). "The ends may be noble or they may be based. They may be 'material' or 'immaterial'—if ends can be so described. But if the attainment of one set of ends involves the sacrifice of others, then it has an economic aspect." (Robbins, 1935, pp. 24-25).

3.2 The relationship between end and means

From the perspective of Machiavellianism, the end and the means are independent items to some extent, because Machiavellianism believes that the ends justify the means⁷, this means that to achieve the goal, any means can be taken, and these means are reasonable and legal.

From the perspective of Kantian, the relationship between the end and means needs specific analysis (Löhner, 2005, pp. 5). "According to Kant, to treat another merely as a means is to do something morally impermissible; it is to act wrongly."⁸

Hegel affirmed that the end must have an objective premise, the end is initially subjective, the end must directly abandon its premise through actual movement, and at the same time abandon its subjectivity to achieve the unity of subjective and objective, to establish the object as prescribed by the concept and make itself an objective. This is the realization of the end. In the process of achieving the end, the means is a bridge and an intermediary that combine the subjectivity and objectivity of the end. "Means in this context is a form of activity which are already a part of the existing formation."⁹

3.3 The nature of end and means

In the philosophical sense, end belongs to the category of intrinsic value, and means belongs to the category of instrumental value.¹⁰

View from the perspective of economics, the means represent resources, the ends represent the human needs or want. Therefore, ends belong to the subjective category, and means belong to the objective category. In the consumer behavior theory of economics, the nature of human wants includes several points as following: (1) wants are unlimited; (2) different wants have different degrees of intensity, i.e., some wants are urgent, some are less intense; (3) human wants to tend to be competitive, due to the limited resources; (4) human wants can be complementary too; (5) any person's

wants will constantly be changing according to the time, place, and situation; (6) human wants of a person can become his habits or customs over time.

Due to ends belonging to the subjective category, human wants can be divided according to the above ways, and due to means belonging to the objective category, resources can't be divided according to the above ways.

3.4 Maslow's hierarchy of needs does not include transportation

Maslow's first level needs, i.e., physiological needs, include breathing, water, food, sleep, clothing, and shelter. Maslow's second level needs, safety, and security needs include personal security, emotional security, financial security, health and well-being, safety needs against accidents/illness and their adverse impacts. Financial security is manifested in many ways, importantly among them job safety. Maslow's third level needs, i.e., social belonging, fourth level needs, i.e., esteem, fifth level needs, i.e., self-actualization, and sixth level needs, i.e., self-transcendence.

Analyzing the Maslow's theory of the hierarchy of needs, we can know that transportation is not included in the physiological needs. In the second level needs, human rights are a guarantee of personal security needs, the freedom of movement is one kind of human rights, but the meaning of freedom of movement is different from the meaning of transportation. Maslow's third level needs, fourth level needs, fifth level needs, and sixth level needs, all do not include transportation, which means, transportation is not reflected in Maslow's hierarchy of needs. Therefore, transportation does not belong to the category of ends. Then transportation can only belong to the category of means.

4 The Critique of the Theory of Transportation System Users' Hierarchy of Needs

4.1 Transportation is a means help people to satiate their wants

Wikipedia defines transportation as "the movement of humans, animals, and goods from one location to another."¹¹

In nature, the human needs included in Maslow's hierarchy of needs and the human needs for transportation are not on the same order of magnitude, as the human needs included in Maslow's hierarchy of needs belong to the category of ends, but the human needs for transportation belong to the category of means because all of life's necessities and pleasures that humans need cannot possibly locate within reach of their static bodies. So, if there were not transportation, humans need could not be realized.

4.2 The creators of the theory of transportation system users' hierarchy of needs did not provide a sufficiently strong argument for the rationality of this theory

⁷ <https://www.ethicssage.com/2018/04/do-the-ends-justify-the-means.html>

⁸ <https://plato.stanford.edu/entries/persons-means/>

⁹ <https://www.ethicalpolitics.org/ablunden/works/means-ends.htm>

¹⁰ https://en.wikipedia.org/wiki/Instrumental_and_intrinsic_value

<https://ijbassnet.com/>

¹¹ <https://en.wikipedia.org/wiki/Transport>

<http://dx.doi.org/10.33642/ijbass.v6n8p2>



Winters, et al. (2001) propose the theory of transportation system users' hierarchy after Maslow's Hierarchy of Needs. In this theory, Winters, etc.al directly determine the content and order of the five hierarchies according to their preferences and intuitions. Their argument process is as below:

1. "The traveler's safety and security are considered to be the most basic need. Timesaving, convenience, etc. are nearly meaningless considerations if personal safety is threatened." (Winters, et al., 2001, pp.36) "The next highest need relates to travel time, including access time, waiting time, and in-vehicle time." (Winters, et al., 2001, pp.36)
2. "The third level is categorized as social acceptance as reflected by personal and peer/society attitudes toward modes (for or against)." (Winters, et al., 2001, pp.37)
3. "Of course, the choices that provide a cost advantage offer another need." (Winters, et al., 2001, pp.37)
4. "Finally, as the traveler seeks to optimize the travel experience then the needs of comfort and system reliability come to bear." (Winters, et al., 2001, pp.37)
5. "Once the personal safety needs of the transportation system user are met to his or her satisfaction then the time need is addressed. When the time need is met then convenience need pops up. Finally, we hypothesize that comfort and convenience are the lowest ordered need." (Winters, et al., 2001, pp.37)

From the above argument process, it can be known that Winters, etc.al do not offer a sufficiently strong argument, except for the first hierarchy of safety and security, why other levels are at this hierarchy? Winters, etc.al have not given instructions and arguments. In the (6), the hierarchy of transportation needs to jump directly from hierarchy second, time need, to hierarchy fifth, convenience need.

Afterward, Winters, etc.al also argue their views by way of examples, such as "a commuter may be circling downtown looking for an affordable parking space but once the price level need is met then the next need is convenience in terms of parking in a nearby location" (Winters, et al., 2001, pp.39). In this example, when this commuter finds a parking place with a met price level, this commuter will decide to park here at once, this commuter will not have a chance to think whether this parking place is convenient or not. The commuter has all arrived at the parking lot. For this commuter, can you find a parking lot more convenient than this parking lot in the world?

Listing another example from Winters, et al.'s paper, such as "a tourist exits his hotel room and decides to cross eight-lane of Fowler Avenue to eat dinner at a local restaurant. He has two practical options: walk or drive. Even though it may be quicker to walk across the busy highway, he assesses the trip as a real threat to his personal safety if he tries to cross.

Therefore, the basic need for safety and security overrides other needs (e.g., quickest method from point A to point B) and he chooses to drive" (Winters, et al., 2001, pp.39).

The second example shows that the tourist makes a limited substitution in safety and security need and time need. There are now two options: walking and driving. Each of which contains two elements, the degree of safety and security, and the length of time taken. The characteristic of walking mode is lower safety, but the time taken is shorter, driving safety is higher, but it takes a long time. In the author's example, the tourist chose the driving method. Now we assume that if the tourist's time schedule is very tight, and the tourist has an urgent matter to do after 30 minutes and must eat, then at this time, time is very precious for the tourist, then it can be inferred that the tourist will choose the way of walking. It should be clear that there is no absolutely safe mode of transportation in this world, only that the degree of safety is different.

Here, we can see that when people choose mode and tool of transportation, security factor and time factor are considered at the same time, and the relationship between security factor and time factor is a marginal substitution relationship in microeconomics. Maslow's hierarchy of needs theory expresses that human hierarchy of needs do not co-exist at the same time, but once a need is to be satisfied, then a higher hierarchy of need emerge.

4.3 The proponents of the theory of transportation system users' hierarchy of needs did not provide a sufficiently strong argument for the rationality of this theory

Perone, et al. (2005) is the most prominent proponents of the theory of transportation system users' hierarchy of needs because the primary focus of their research project "was in providing empirical evidence of a Hierarchy of Transportation Needs" (Perone, et al., 2005, Abstract).

To offer empirical evidence of a Hierarchy of Transportation Needs, they first replaced the Maslow's Hierarchy of Needs theory by Alderfer's Existence, Relatedness, and Growth (ERG) theory, then they designed a statistical questionnaire, in which those questions could be divided into three parts. The first part included some of the "Existence versus Growth (ER), Existence versus Growth (EG), and Relatedness versus Growth (RG) types of questions" (Perone, et al., 2005, pp23). The second part of the questions was relative to a certain scenario which was rank Existence, Relatedness, and Growth variables, the respondents were asked which situation they would choose. The third part was the specified 30 items questions. Their survey showed that "most participants chose Existence needs over Relatedness over Growth needs" (Perone, et al., 2005, Abstract).

We think the reason why Perone, et al., (2005) replace Maslow's Hierarchy of Needs theory with Alderfer's Existence,



Relatedness, and Growth (ERG) theory is that under Alderfer's Existence, Relatedness, and Growth (ERG) theory, this statistical questionnaire can be designed. If under Maslow's Hierarchy of Needs theory, this statistical questionnaire could not be designed. Therefore, the empirical evidence they provide is indirect evidence, not direct evidence.

Even under the situation which they replace Maslow's Hierarchy of Needs theory with Alderfer's Existence, Relatedness, and Growth (ERG) theory, we still think that their reasoning process is flawed because most participants choose Existence needs over Relatedness needs over Growth needs, this only shows that Existence needs are more important to someone than Relatedness needs to this person, and Relatedness needs are more important than Growth needs to this person. It does not show the complete substitution between the Existence needs, Relatedness needs, and Growth needs. i.e. Someone satiates the Existence needs, then pursues the satiation of Relatedness needs, and then pursues the satiation of Growth needs. When a means of transportation is selected for use, it is possible to consider the three needs, Existence needs, Relatedness needs, and Growth needs, at the same time.

4.4 Factors that humans need to consider when faced with the choice of modes of transportation and transportation

Winters, et al.'s hierarchy elements of transportation system users' hierarchy needs come from the Dow Jones User Ratings, in which rating elements include comfort, safety, speed or time, reliability, connectivity, convenience, enjoyment/aesthetics. (Winters, et al., 2001, pp.19)

In the Dow Jones User Ratings system, during the decision-making process, all elements must be considered at the same time, and the weighted average method is used, but

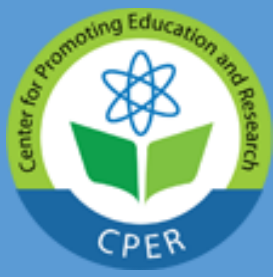
these elements have different weights, and different people use different weights. For Winters, etc.'s hierarchy elements of transportation system users' hierarchy, the weighted average method should also be used, and all elements are needed to be considered at the same time. That means all hierarchies, i.e. safety and security, time, societal acceptance, cost, comfort, and convenience, should be rated at the same time, rather than when the first hierarchy safety and security need is met, then begin to consider the second hierarchy time need, and so on to the fifth hierarchy comfort and convenience.

5. Conclusion

From the perspective of philosophy, human wants and needs belong to the category of the end, and transportation belongs to the category of means. In the context of economics, the means represent resources, the ends represent the human needs or want. In the philosophical sense, end belongs to the category of intrinsic value, and means belongs to the category of instrumental value. Therefore, ends belong to the subjective category, and means belong to the objective category. In the consumer behavior theory of economics, the nature of human wants/needs is unlimited; different wants/needs have different degrees of intensity; human wants/needs tend to be competitive, due to the limited resources. Due to the above nature of human wants/needs, human wants/needs can be divided into Maslow's hierarchy of needs, and due to means belonging to the objective category, resources/means can't be divided hierarchically modeled Maslow's hierarchy of needs. Transportation belongs to the category of means/resources, so the theory of Transportation System Users' Hierarchy of Needs is inappropriate.

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