

Tamara Jakovljevic¹
Tadeja Jere Jakulin
Gregor Papa

THE ROLE OF COLOUR SENSING AND DIGITALIZATION ON THE LIFE QUALITY AND HEALTH TOURISM

Abstract: *This paper presents the perception of the quality of life and its relation to the digitalisation process in healthcare and the health tourism system. Health tourism system is part of the business transformation process inducted by the new technological improvements. Through this paper, we want to understand better how the process of digitalisation affects the quality of life. This paper deals with the influence and applicability of sensor measurements in the creation of a new offer for innovative tourism and its reflection on tourism quality. It discusses the potential of measuring the impact of environmental colors on human body conditions to achieve the best solutions for wellbeing.*

Keywords: *Quality of life, Tourism quality, Sensors, Colours*

1. Introduction

It is not simple to define the term quality of life, because it involves several aspects of personal satisfaction in different spheres of life, as well as the psycho-physical condition of a person. This term is so often in use today, and it is considered that the way tourists grade the quality of life will replace the accepted GDP analytics. It is also important to mention that the well-being of tourists is most commonly related to the term of quality of life. And so, first of all, we will consider the definitions of the quality of life as well as health-related quality of life.

The quality of life can also be defined as overall well-being comprising physical descriptors and subjective evaluations of physical, material, social, and emotional welfare along with the level of personal development and purposeful activity weighted by an own set of values (Felce D & Perry, J. 1993). It can also be formulated regarding one's context, the absence of well-being, or in a collective manner (Pollard, E. L., & Lee, P. D. 2003). As written in the

report "Wellbeing and policy", countries worldwide are becoming attracted to these appealing ideas but are worried about how they can be implemented in real life. It means that the authors of the report suggesting that such ideas could encourage the governments and individuals to make 'better' decisions that would contribute to enhancing the overall wellbeing.

Chancellor Merkel pointed to the relevance of the notion of wellbeing by stressing the following: Industrialized countries do not only have the GDP and growth issues. Even hard-nosed central bankers, like Ben Bernanke, have argued: "The ultimate purpose of economics, of course, is to understand and promote the enhancement of well-being." Very few academics would say that a country should invest efforts into maximising the GDP.

And when we discuss the health tourism system, the data relating to the well-being of tourists and their health has become more valuable on the grey market than credit card information. This paper deals with the perception of the quality of life and its

¹ Corresponding author: Tamara Jakovljevic
Email: tamara.jakovljevic@hotmail.com

relationship with the health status of the individual, as well as the way in which the digitalisation of the health tourism industry affects the quality of life; but also, how one measures quality within the health tourism system.

Furthermore, ensuring quality facilities or services for tourists is an essential factor for generating sustainable products, particularly regarding smaller and less accessible market segments that are heavily dependent on the natural and cultural heritage. If high-quality tourism products are produced, it is more likely that the tourists will be more satisfied and will have positive travel experiences. Additionally, they will most probably stay longer, return to the destination, recommend it to others and would care about the preservation of the local heritage (European Commission, 2002). Therefore, sensor measurement can be beneficial in numerous ways regarding tourism and quality of services.

Colors produce different physiological responses in blood pressure, heart rate, respiration, digestion, body temperature, and brain activity. Many types of research done proved that colours could give positive physiological impact not only to human but also plants (Daggett W. R., Cobble J. E., Gertel S. J. 2008). Usually, what is taken into account is a personal attitude of users, but the understanding the impact of colors may enable us to improve our offers using an innovative approach to tourism.

2. Life quality and health

A highly influential definition of health is provided by World Health Organization (WHO), they define health as “a state of complete physical, mental and social well-being, and not merely the absence of disease and infirmity”.

Some key aspects like social well-being and the emphasis on more than the absence of disease are included in WHO definition. And because not everyone agrees on the inclusion

of social well-being in the definition of health, it is important to calculate that fact too (Torrance GW, (1987). For example, some authors define health as “an individual's level of function” (Patrick DL, Bush JW, Chen MM, 1982), where “optimum function” is judged in comparison to “society's standards of physical and mental well-being”. Quality of life has proven challenging (Moons P, Budts W, De Geest S, 2006; Brazier J, Connell J, Papaioannou D, Mukuria C, Mulhern B, Peasgood T, et al., 2014) and many approaches to determining the quality of life exist (Ferrans CE, 1990). There are approaches based on subjective well-being, expectations and human needs (Bowling A, 2005).

Related literature on well-being distinguishes between approaches based on objective lists, preference satisfaction, hedonism, flourishing, and life satisfaction (Peasgood T, Brazier J, Mukuria C, Rowen D, 2014).

Other examples of definitions of Quality of life are: “an individual's” perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (Kuyken W, Group TW, 1995), “a conscious cognitive judgment of satisfaction with one's life” (Rejeski WJ, Mihalko SL, 2001).

Health-related quality of life has also been problematic to define (Bowling A, 2005). We can identify a few definitions in the literature of health-related quality of life (HRQoL). It can be described as “how well a person functions in their life and his or her perceived wellbeing in physical, mental, and social domains of health” (Hays RD, Reeve BB, 2008), other definition relates HRQoL directly to QoL: “quality of life is an all inclusive concept incorporating all factors that impact upon an individual's life. Health-related quality of life includes only those factors that are part of an individual's health” (Torrance GW, 1987).

3. Health and wellness tourism quality

The definition of ‘health’ is becoming broader and much closer to that of ‘wellness’. Thus the terms are sometimes used interchangeably. The same is true of ‘wellbeing’, ‘happiness’, and ‘quality of life’, therefore recent theories from sociology or psychology are used to make some distinctions. (Smith, M., Puczko, L., 2008).

There are only a few handful frameworks which can be used for analytic purposes of quality assessment in health and tourism quality. In the private and public sectors, these frameworks have guided the measure development initiatives, and the most influential among them was implemented by the Institute of Medicine (IOM). The structure itself examines six criteria throughout the health and tourism system (Institute of Medicine IOM, 2001): Effectiveness, Safety, Spa tourist-centeredness, Timeliness, Efficiency, Equitability. The measures used currently give priority to some of these criteria more than to others. For example, the present majority of actions is focused on safety and effectiveness, whereas only a small portion gives importance to timeliness and spa tourist-centeredness. And even fewer tests assess the influence of efficiency and equitability (Institute of Medicine IOM, 2005). Frameworks like this also prove to be a good learning curve for helping others understand the true meaning and importance of quality measures. And research has demonstrated that by having a framework with which you can grasp the relevance of quality measures, you, are capable of valuing a full range of quality indicators. So, if you were to offer a detailed explanation of the importance of safety, efficiency and spa tourist-centeredness, consumers would have no trouble grasping the relevance of all three criteria. Better yet, when you take those

three IOM domains and present them in user-friendly versions of the measures they represent, the consumer can comprehend the importance of those measures more clearly and from a personal health tourism perspective (Hibbard JH, Pawlson LG, 2004).

3.1. Life quality and tourism quality

Although the standard of living and quality of life of many people throughout the world is still deemed low by western standards (e.g. in India, Africa, or amongst indigenous tribal groups), those people have found their ways of preserving health and maintaining wellbeing (Hibbard JH, Pawlson LG, 2004). Following this statement, we can say that life quality is an individual’s perception of their position in the context of culture and related value systems and in agreement with their goals, expectations, standards and concerns. It is a broad-ranging concept incorporating the person’s physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship with the salient features of the environment (The WHOQOL Group. 1998) complexly. The quality of life (QOL) concept can significantly vary along the dimension of objective and subjective, normative and individualised. Subjective QOL is a broad term that covers life satisfaction happiness and personal wellbeing (Sirgy, M.J. 2001). The term “subjective well-being” can sometimes be used reciprocally with individuals in the literature (Academic.Costanza, R. et al. 2007). Own well-being can also be defined as customers’ perception and satisfaction with his/her overall life quality.

There are two main approaches to measuring life quality: objective and subjective. The difference between subjective and objective measures of QOL is determined based on their connection with customers “subjective awareness” (Veenhoven, R. 2006).

One of the critical measurement categories in tourism is visitor satisfaction, which is

influenced by recommendations, as well as quality indicators. The research on the quality of life is undoubtedly connected to the consumer satisfaction, or visitors, in the case of tourism. Providing personal reports on service satisfaction correlates with the comfort with the quality of life.

3.2. Wellbeing

The concept of wellbeing implies our normal levels of satisfaction and contentment (Smith, M., Puczko, L., 2008). The quality of life is also identified as overall wellbeing comprising physical descriptors and subjective evaluations of physical, material, social and emotional well-being along with the level of personal development and purposeful activity weighted by an own set of values (Felce, D., & Perry, J. 1993).

Well-being has been defined by the personal characteristics of an innately positive condition (happiness). It has also been determined based on how self-esteem can be measured on a continuum from positive to negative. It can also be formulated regarding one's context (standard of living), the absence of well-being (depression), or in a collective manner (Pollard, E. L., & Lee, P. D. 2003). Tourism includes wellbeing as well as the quality of life. Since tourism provides rest, relaxation and new experiences, that in itself increases the degree of the quality of life and wellbeing in general.

4. Sensors and smartcare in health tourism

When it comes to the aspect of digitisation, there are two closely-related meanings that we can consider crucial: Digitisation presents the transformation of analog/physical things (paperwork, photographs, sounds etc.) and the creation of their digital counterparts (bits and bytes). So, it's just that – a simple

conversion/representation of non-digital matter into digital, which can then be used by computing systems.

On the other side, digitalisation serves to: Create revenue, Improve business, Replace/transform business processes (instead of digitising them), Create the foundation for digital business processes. The structure of this endeavor uses digital information as the core, whereas digital technologies and data (digitised and natively digital) are used as the building material.

In comparison to digitalisation, digital transformation is a broader concept of upgrading to digital business. The foundation you build with a digital transformation strategy is much more significant because it requires more elements to help it function. Digital transformation initially served a straightforward purpose of converting paper into digital information – since that time, it has significantly evolved.

And these types of examples are present in all industries, where the prevalence of legacy technology stand in the way of a revolutionary digital transformation strategy that can only contribute to a business.

So, if modern-day businesses ever want to experience actual progress in the digital age we live in, they need to take the next step and invest into the development and efficiency of technology wherever there is potential to do so. And for most businesses, this would mean adjusting and adopting new principles across their company.

Smart care, care anywhere, empowered responsibility and creative health tourism enterprise – these are the four digital themes that will prove to be essential to the digital transformation of health tourism in the future.

Smart Care will use precision medicine, robotics and medical printing to improve spa tourist outcomes and lower health, tourism costs.

Care Anywhere will make household health tourism a reality, with the help of advances in connected homes and virtual care.

Empowered Care will give tourists more

control in managing their well-being and health tourism through the development of “living services”.

Intelligent Spas makes possible for health tourism employees and their spas the option of monitoring spa tourist health more effectively in real time, with the help of data-driven solutions. Value-based health tourism is quickly becoming a reality with the advancement of the digital aspect. With new technological advancements, the gap between the physical and digital world is growing much smaller. As a result, spas and other health tourism facilities are available to consumers with a simple click, scroll or tap. You now have combined smart sensors, devices and highly connected software that can lead spa tourists to precisely what they need – low-cost health tourism outcomes with top-quality the experience and convenience.

5. Colour influence

The master thesis (Hulshof Bart 2013) defined the influence of colour on different psychological and physiological phenomena. “Colour can be distinguished in hue, brightness and saturation” (Valdez, P., & Mehrabian, A. 1994). Difference between cool and warm colours roots in hues. Colours with short wavelengths (i.e. violet and blue) belong to cool colours. Colours with long wavelengths (i.e. red and orange) belong to warm colours. There exists a hierarchy in colour from violet, blue and green (short-wavelength colours) to yellow, orange and red (long-wavelength colours) (Crowley, A.E. (1993). We wouldn't percept colours in the same way if there wouldn't be shades of brightness and saturation. The colour could be light or dark, and it is determined with “brightness”. Reflection with low light is a dark colour, and much light is, naturally light colour (Hulshof Bart 2013). Clarity of tone has been determined through saturation. Gray shades are the result of low saturation, and sharp and bright

colours are a result of high saturation. If brightness and saturation are high, colours are more enjoyable for the eye (Camgöz, N., Yener, C., & Güvenç, D. 2002). Positive feelings like felicity, hope and joy are related to bright colours-according to Hemphill (Hemphill, M., 1996). Grandjean believes as well that bright colors provoke friendlier, more cultured, pleasant and more beautiful reactions.

On the contrary, dark colors are connected with boredom, sadness and negativity (Hulshof Bart 2013). Tofle et al. (Grandjean, E. 1973) concluded that culture and someone's personality influence emotions caused as a reaction to the specific color. Associations between tone and mood have been researched by Wexner (Tofle, R.B., Schwartz, B., Yoon, S., & Max-Royale. 2004). People were supposed to imply a mood which they associate with the colour they see in front of them. Quiet, relaxed and calm moods were reactions to cool tones of colour. On the contrary, anxious and tensed moods were associated with warm tones. Relevant information is that participants of the experiment were not in the coloured environment, but only faced colored cards.

Numerous factors have a considerable bearing on tourists' perception of a destination, regarding the level of their satisfaction, as well as tourists' willingness to repeat their visit and recommend the destination to prospective visitors (European Commission. 2002). Measurements can help us to create new innovative views and solutions. It is concerned with the efficient use of resources, and the level of participation and satisfaction of human resources in an organisation. It admits that an organisation can have a wider scope of objectives and should achieve them in an integrated way. According to the report, Integrated Quality Control aims to contribute to the advancement and implementation of directions which lead to tourism quality. The quality of tourism service is high provided that the visitor positively rates his/her

satisfaction with that service and demand. That is why it is important to discover all the aspects of customer's experience so that the quality could be provided and related costs minimised. Measuring environmental color parameters allows us to ensure that the tourist is provided with the desired conditions through value reports or allowing them to set the desired shapes on their own.

6. Conclusion

In further research, we could measure not only the color environmental parameters and tourist satisfaction and the effect of smart sensor hubs implementation on the fulfillment of user requirements and quality, but also use sensors for measurement of the human body condition to compare the parameters of wellbeing and subjective wellbeing of visitors. Innovation is the heart of any successful company's agenda, so the role that change plays in securing competitiveness is a crucial topic. The importance of innovation in service activities was underestimated for a long time, as innovations in services and tourism were secondary and underfunded. Thus, they were excluded from the scope of government interest and action. It is worth noting that the

discourse altered with the emergence of new information and communication technologies, which have been particularly significant in tourism. The dissemination of new production modes and the resulting organisational shockwaves, along with the marketing adjustments entailed, have been a widely explored research topic (Dupeyras, A., & MacCallum, N. 2013). It proposes that the philosophical and psychological influences of the 20th century enable us to understand more fully the dynamic relationship between thriving, surviving and color. Particular attention is paid to the work of Carl Jung. It introduces the theory of color analytical psychology as a tool that can enable us to apply a wealth of knowledge and approach to themes of health and wellbeing across a broad spectrum of professions such as town planning, fashion design and retail.

Therefore, we have a complete innovative circle which follows the current trends in information and technical revolution. It is essential to keep continuously learning, checking and improving all the processes to receive the results. These activities represent the only way for the organisation to achieve its goals and improve the quality of services.

References:

- Academic.Costanzaa, R. et al. (2007). Quality of life: An approach integrating opportunities, human needs and subjective well-being. *Ecological Economics*, 61(2-3), 267-276. doi: 10.1016/j.ecolecon.2006.02.023
- Bowling A, (2005). *Measuring health*. Maidenhead: Open University Press
- Brazier J, Connell J, Papaioannou D, Mukuria C, Mulhern B, Peasgood T, et al., (2014). A systematic review, psychometric analysis and qualitative assessment of generic preferencebased measures of health in mental health populations and the estimation of mapping functions from widely used specific measures. *Health Technology Assessment*;18.
- Camgöz, N., Yener, C., & Güvenç, D. (2002). Effects of hue, saturation, and brightness on preference. *Colour Research & Application* 27, 3, 199-207.
- Crowley, A.E. (1993). The two-dimensional impact of colour on shopping. *Marketing Letters*,4, 59-69
- Daggett W. R., Cobble J. E., Gertel S. J. (2008). *Colour in an Optimum Learning Environment*. International Center for Leadership in Education, Harvard Jolly, Inc.
- Dupeyras, A., & MacCallum, N. (2013). Indicators for Measuring Competitiveness in Tourism:

- A *Guidance Document*. Paris: OCED Publishing. doi:10.1787/5k47t9q2t923-en
- European Commission. (2002). Using natural and cultural heritage to develop sustainable tourism in non-traditional tourist destinations. Luxembourg: *European Commission*.
- Felce D., & Perry, J. (1993). *Quality of life: A contribution to its definition and measurement*. Cardiff: University of Wales College of Medicine.
- Ferrans CE, (1990). Quality of Life: Conceptual Issues. *Seminars in Oncology Nursing*; 6:248–54.
- Grandjean, E. (1973). *Ergonomics of the home*. New York: Wiley.
- Hays RD, Reeve BB, (2008). Measurement and Modeling of Health-Related Quality of Life. *International Encyclopedia of Public Health*
- Hemphill, M., (1996). A note on adults' colour-emotion associations. *Journal of Genetic Psychology*. 157(3), 275-280.
- Hibbard JH, Pawlson LG, (2004). Why Not Give Consumers a Framework for Understanding Quality. *Joint Commission Journal on Quality Improvement* June. 30(6); 347-351.
- Hulshof Bart (2013). *The influence of colour and scent on people's mood, master tesis*. The University of Twente.
- Institute of Medicine (IOM), (2001). Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, D.C: *National Academy Press*.
- Institute of Medicine (IOM), (2005). Performance Measurement: Accelerating Improvement. Washington, D.C: *National Academy Press*
- Kuyken W, Group TW, (1995). The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. *Social science & medicine*; 41:1403–9.
- Moons P, Budts W, De Geest S, (2006). Critique on the conceptualisation of quality of life: A review and evaluation of different conceptual approaches. *International Journal of Nursing Studies*; 43:891–901
- Patrick DL, Bush JW, Chen MM, (1982). Toward an Operational Definition of Health. *Journal of Health and Social Behavior*; 14:6–23.
- Peasgood T, Brazier J, Mukuria C, Rowen D, (2014). A conceptual comparison of well-being measures used in the UK, *Policy Research Unit in Economic Evaluation of Health and Care Interventions*. Universities of Sheffield & York, EEPRU Research Report 026, Policy paper/document 01/09/2014.
- Pollard, E. L., & Lee, P. D. (2003). Child well-being: A systematic review of the literature. *Social Indicators Research*. 61(1), 59-78. doi:10.1023/A:1021284215801.
- Rejeski WJ, Mihalko SL, (2001). Physical activity and quality of life in older adults. *The journals of gerontology, Series A, Biological sciences and medical sciences*, p. 23–35.
- Sirgy, M.J. (2001). *Handbook of quality of life research: An ethnical marketing perspective*. Dordrecht: Kluwer
- Smith, M., Puczko. L., (2008) *Health and Wellness Tourism*. Butterworth and Heinemann. New York
- The WHOQOL Group. (1998). The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties. *Social Science and Medicine*, 46(12), 1569-1585. doi:10.1016/S0277-9536(98)00009-4
- Tofle, R.B., Schwartz, B., Yoon, S., & Max-Royale. (2004). Colour in healthcare environments: A critical review of the research literature. California: *The Coalition for Health Environments Research (CHER)*.
- Torrance GW, (1987). Utility approach to measuring health-related quality of life. *Journal of Chronic Diseases*, p. 593–600.
- Valdez, P., & Mehrabian, A. (1994). Effects of colour on emotions. *Journal of Experimental*

13th IQC QUALITY RESEARCH International Quality Conference

Psychology: General, 123(4), 394-409.

Veenhoven, R. (2006). *How do we assess how happy we are. Tenets, implications and tenability of three theories*. Notre Dame: University of Notre Dame.

Wexner, L.B. (1954). The degree to which colours (hues) are associated with mood-tones. *Journal of Applied Psychology*, 38, 432-435.

World Health Organization (2014). *Constitution of the World Health Organization, 48th ed. Basic documents of the World Health Organization*, Geneva.

Tamara Jakovljevic

Jozef Stefan International
postgraduate school,
Slovenia

tamara.jakovljevic@hotmail.com

Tadeja Jere Jakulin

Faculty of tourism studies-
Turistica,
Slovenia

tadeja.jerejakulin@upr.si

Gregor Papa

Institute Jozef Stefan,
Slovenia

gregor.papa@ijs.si
