A Collective Sense of Place and the Image of the City @ Urban Public Spaces : Analysis on People's Perception of User-Generated Image Content and Hashtags on Instagram

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ABSTRACT

Urban public spaces are constantly restructured with new meaning, reflecting their sociocultural, political, historical, and technological influences. Over the last two decades, the rapid technological advancements and increasingly widespread use of mobile devices give people a chance to share their experiences of their immediate surroundings through various applications. As these platforms enable people to create and exchange various forms of User-Generated Content (UGC) has gained wide attention as an invaluable source of information on human-environment relationships including people's timely perception, emotion, preference and *sense of place* in public space.

This study employs a quantitative content analysis to identify collective perceptions of urban public spaces and their characteristics as projected through a photo-sharing social media application, Instagram. A total of 1,200 users' photos and associated hashtags geo-referenced to three New York City urban public spaces, Bryant Park, Madison Square Park, and Union Square. This study begins with a qualitative phase, employing manual categorization techniques to identify the concepts in visual and textual data. The second phase applied a statistical analysis method, a set of descriptive analytics, and chi-square tests to answer the research questions for this study.

Findings indicate physical attributes of urban squares are the most dominant type of geo-referenced users' photographs through the visual social media platform. People's immediate perceptions vary with time and place, while the patterns of hashtag usage found in this study show no difference across the three urban squares. people's perception of urban squares goes beyond the boundaries of the square itself, encompassing the streetscape, buildings, and local businesses adjacent to the square. While people rarely utilize hashtags as a method of emotional expression, findings show a clear connection between hashtags associated with users' photo content and the image of the city.

General Audience Abstract

The proliferation of mobile devices and social media platforms has given people new opportunities to document and exchange their experiences in urban public spaces. Publicly available content, which communicates timely opinions, perceptions, emotion, and preferences has a strong influence on the formation of the overall perception of urban public spaces in the digital environment.

This study aims to explore how a sense of place—including emotional value, urban identity, distinctiveness, and seasonality—is built in urban public spaces through one image-sharing application, Instagram. In addition, hashtags attached to the photographs are collected to help understand people's motivations for posting content in urban public places. The study compiles 1,200 photographs on Instagram taken at three New York City public spaces, Bryant Park, Madison Square Park, and Union Square.

The study finds that people tend to post content that focuses on the physical appearance of the squares. However, people's perception of urban squares goes beyond the boundaries of the squares themselves, encompassing the streetscape, buildings, and local businesses around each square. One important function of Instagram in these spaces is for people to write information to document their experiences in the urban squares. There are also strong connections between the visitors' perceptions of urban public space as seen through their photographs and the image of the city.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

Introduction

Over the past two decades, a plethora of social media platforms have been developed and become readily available, enabling virtually anyone to publish content across a wide range of types (Llodra et al., 2015). This profusion of user-generated content (UGC) has generated a large volume of attainable data and has drawn attention across academia, policy, and practice to new opportunities to understand the concept of place in contemporary cities (Jenkins et al., 2016). Some of this research has utilized people's photographs on the image-sharing social media platform Instagram as an alternative participant-generated image (PGI) approach to exploring a collective sense of place. However, there is a paucity of research focusing on user-taken pictures to understand people's experience in urban space, and even less research examining users' experience in relation to their patterns of hashtag use. As an emerging cultural convention in the digital realm, hashtags in urban spaces may provide meaningful insight into the human-environment relationship in the age of digital networks. This is because they not only encompass types of information acquired by conventional methods in place research such as interview and survey, but also help to identify new phenomena created by hashtags' practical values and connectivity across the Internet.

The literature on sense of place varies widely in research purposes and disciplines, and therefore presents heterogeneity in terminology, framework, and constituent factors used to describe the human-environment relationship (Cross, 2001; Hernández et al., 2014; Mihaylov & Perkins, 2013). This dissertation conceives geo-referenced user content in urban space as a collection of an individual's "immediate perceptions" (Raymond & Stedman, 2017). Despite the variability of structure of sense of place, most theoretical

developments on sense of place have "privileged the slow" (p. 1), Raymond and Stedman consider "immediately perceived meanings" (p. 1) as one of key blind spots in the sense of place scholarship. They also suggest that a reconsideration of sense of place as "fast" and "slow" complement each other, and such reconsideration could fill the said blind spots. Together, these contribute to an overall shape of sense of place in a particular public space in the digital sphere. Many researchers have attempted to investigate sense of place with geospatial data from social media by focusing on settings ranging from urban spaces and neighborhoods to entire cities and regions. A clear majority of those efforts have taken advantage of the advanced computational techniques available for text-based data (e.g. Twitter). Such techniques have gained popularity as a means of analyzing people's uses, opinions, emotions, or preferences in urban space (Ciuccarelli et al., 2017; Choi et al., 2007; Sevin, 2013; Jenkins et al., 2016; H. Kim et al., 2017). In contrast to such studies of general text contents, this dissertation explores people's visual data and presents the first attempt to understand people's pictures in urban public space through the lens of associated hashtags.

The following sections give a brief background of this study and present the research problems and the research purpose that emerges from them. The research questions are then presented, followed by a description of the scope of this study and the significance which this research may contribute to the knowledge in relevant fields of study and practice. In the last section, the overall structure of this work is described.

1.1 Background

The concept of place is constantly evolving. Over time, urban public spaces are restructured with new meaning, reflecting their sociocultural, political, historical and technological influences. The digital environment amplifies the visibility of this constant restructuring; the rapid technological advancements and increasingly widespread use of mobile devices give people a chance to share their experiences of their immediate surroundings through various applications built on the advances of Web 2.0. These platforms enable people to create and exchange various forms of user-generated content (Kaplan & Haenlein, 2010) on the Internet. Even a growing number of urban parks are beginning to offer free Wi-Fi, which attracts more visitors to public spaces (Hamstead et al., 2018) and may also increase the likelihood of people sharing their uses of and feedback on urban public space. These changes have led to fading of the boundary between the *real* world and *cyberspace*, which has helped on-site and online perceptions of urban public spaces to converge (Heyd & Puschmann, 2017). Utilizing the burst of user content available through varied social media outlets to understand people's perceptions and spatial practices in contemporary urban public spaces is an inevitable next step.

In response to its significant potential for urban study, geo-located social media data has been actively implemented in urban researches and practices and has offered new opportunities and challenges. Particularly, user-generated content (UGC) has gained wide attention as an invaluable source of information on people's timely perception, opinion, emotion, preference and satisfaction in public space. Social media analytics provide growing evidence of UGC's effectiveness and feasibility in understanding the human-environment relationship, challenging conventional research methods such as survey and interview (H. Kim et al., 2017). Text analysis is a well-established tool of social media analytics, and ranges from simple word frequency analysis to advanced machine learning

approaches such as topic modeling. Many recent initiatives have used text analysis techniques to extract themes or values attached to urban places (J. Kim et al., 2019; H. Kim et al., 2017; Jenkins et al., 2016; Marine-Roig & Clavé, 2015).

Although various types of non-textual content exist and are readily available across multiple social media outlets, few studies have used visual content to explore users' perception of urban public space (Kuhzady & Ghasemi, 2019; Acuti et al., 2018; Oteros-Rozas et al., 2018). As a means of "capturing" reality (Fatanti & Suyadnya, 2015), users' photographs offer a novel and significant opportunity to understand urban public space through on-site experience captured on individual users' phone cameras. This approach helps reduce the potential researcher bias in the selection of a sample of photographs (Collier & Collier, 1987); in addition, the content can also be collected with high efficiency and accuracy (Fatanti & Suyadnya, 2015). The underutilization of users' photographs in understanding perceptions of a particular place is explained by the relatively early stage of social media analytics for visual content as compared to that for text-based data. This study draws from the advantages of both technological achievement in collecting samples from the visual application Instagram and human efforts in the coding process (Oteros-Rozas et al., 2018). By utilizing both methods, it aims to explore people's experience through their photographic content from an alternative participant-generated image (PGI) approach.

Given their descriptive and practical values, hashtags associated with people's photographs give meaningful insight into the underlying values or intentions behind an individual user's posts (Ye et al., 2018; Isabelle, 2018, Lupinetti, 2015; Baranovic, 2013). They help researchers understand photo content in more detail, using users' hashtags as an "inscribed notebook" where information is preserved in "literate code" (Collier & Collier, 1987, p.10). The two primary purposes of hashtags on Instagram are as a means of

information sharing and *emotional expression* (Ye et al., 2018; Baranovic, 2013); however, people's hashtag usage in urban public space could be different (H. Kim et al., 2017) from general hashtag usage observed on Instagram. In addition, user types may influence hashtag behavior; in urban public space in the digital environment, a mixture of *professionalized* hashtags by commercial or official profiles and *grassroots* or unofficial hashtags from everyday life are observed (Heyd & Puschmann, 2017). This study excludes commodified or official content in order to extract the general public's perceptions through Instagram.

User content geo-referenced to urban public space can be shaped by a variety of factors. Especially salient are the impacts of platform structure and users' motivation to use a particular platform. Given the complexity inherent in the formation of social media data, a number of validity problems such as platform biases, data availability biases, and data authenticity issues emerge (Ruths & Pfeffer, 2014). Also, users' demographic features (Pew Research Center, 2018; Boyd & Ellison, 2007) differ greatly with different societal and cultural backgrounds based on language or shared racial, gender, religious, or nationality-based identities (Boyd & Ellison, 2007). Another significant factor is users' motivation in their use of a particular social media platform. In the case of Instagram, many researchers have identified people's varied motivations to use the platform. These fall into various categories of self-expression such as social interaction, documentation, diversion, self-promotion, and creativity (Sheldon et al., 2017; Page, 2012). As a medium of self-expression, those motives may or may not (Back et al., 2010) influence an individual's experience in urban public space captured through their social media content.

1.2 Statement of the Problem / Research Purpose

Despite a huge volume of data accessible from a variety of applications, there is a paucity of research into how people's immediate perception is shaped by visual user-generated content as opposed to traditional text-based content such as tweets, blogs, reviews or comments (J. Kim et al., 2019; H. Kim et al., 2017; Ciuccarelli et al., 2017; Jenkins et al., 2016; Sevin, 2013; Choi et al., 2007). Research on users' visual content is of great importance and could offer a more comprehensive view of sense of place in the digital environment. In addition, hashtags, and their association with people's visual contents, should be analyzed together rather than separately as in the word-frequency approach. Given their numerous practical values, hashtags attached to users' photo content could provide crucial evidence of underlying characteristics of collective perceptions in urban public space, particularly in relation to the formation of urban identity in the digital sphere. These perceptions and factors continue to contribute to the ever-changing sense of place of urban public space, with a substantial amount of UGC made every second and geotagged to many spaces.

The primary objective of this study is to identify collective perceptions of urban public spaces and their characteristics as projected through the visual social media application Instagram. Each individual's photograph is interpreted as the user's "immediate perception" (Raymond et al., 2017) in relation to other users' hashtag behavior on their own geo-referenced photographs in the urban space. This may further our understanding of sense of place in the era of digital convergence.

1.3 Research Questions

The primary objective of this research is to identify and provide new information on collective perceptions and their characteristics projected through people's geo-referenced visual content and hashtags in urban public spaces on Instagram. This research aims to fill a gap in the existing body of knowledge on sense of place in virtual environments, focusing in particular on the urban square. To achieve the research objective, a set of research questions about perceptions of social and physical attributes in relation to associated hashtags, emotional quality, urban and place identity and seasonal and monthly variation are used to guide this study. The research questions for this study are as follows:

Research question 1 (RQ1) :
Sense of place is an ever-changing concept tangled with people's perceptions, society and the culture it is in. Therefore, various approaches to understand sense of place have been taken, each in accordance with its own research area. The era of social media, the so-called Web 2.0 era, has provided a new opportunity to examine sense of place. User-generated textual or image content provides information shared through various social media platforms. Perceptions achieved through such content can vary among the types of platforms used, as the multitudes of social media platforms cover a wide range of user interests. Which raises the question of how people describe urban public spaces with image content and hashtags on Instagram, a photo-sharing social media platform.

Sub-question 1-1 (RQ1-1) :
A set of feelings through the interactions between settings and personal and psychological aspects is an important factor in understanding sense of place, and user-generated data including hashtags on social media plays has or can have a critical role in providing such information. What emotional value is contained in hashtags associated with user photographs of urban public spaces?

Sub-question 1-2 (RQ1-2) :
Historically, people's perceptions of urban public space have been closely related to the identity of the city. People's perceptions have added user-generated content, as society has opened itself to the online platforms. This user-generated content is interconnected with the urban public spaces and also the city itself through the users'

hashtags. How does user-generated content of urban public spaces on social media contribute to the image of the city?

Research question 2 (RQ2) :
Place identity is the fundamental factor of sense of place that allows a place to differentiate itself from other public places. Does the user content of shared images and hashtags on Instagram reflect the distinctiveness of urban public spaces, and if so, how?

Research question 2-1 (RQ2-1) :
The concept of a place changes as it interacts with time and the perceptions of seasonal changes are central in determining sense of place. How does user content of shared images and hashtags on Instagram reflect seasonal changes in urban public spaces?

1.4 Scope of the Study / Importance of the Study

This study selects the most well-known urban squares in NYC, Bryant Park, Madison Square Park, and Union Square in mid-Manhattan. As a symbol of a city, the urban square has been reflected in urban culture and lifestyles and has shaped the character and identity of the entire city (Lang & Marshall, 2017). People's perceptions and behavior patterns in an urban square can be influenced by multiple external factors such as its location. This study limits its scope to urban squares that present homogeneity in racial distribution (The New York Times, 2019) and urban context, using the land use map to identify urban squares surrounded by commercial district (New York City's Zoning & Land Use Map [ZoLa][1], 2019; Gehl Institute, 2017). The findings of this research will fill a gap in the existing literature on people's immediate perceptions as a way to understand sense of place in the digital environment, specifically collected through the visual social media outlet Instagram. In addition, this research provides invaluable knowledge of the role of users' hashtags in the urban square in relation to a collective immediate perception for a particular place and the formation of urban identity in the digital environment.

[1] https://zola.planning.nyc.gov/about/#9.72/40.7125/-73.733

1.5 Study Organization

This dissertation is divided into six chapters: Introduction, Literature Review, Methodology, Results, Discussion, and Conclusion. The Introduction provides the background of this study and presents the research questions developed from the discussion of research objectives. It then describes the scope and structure of this dissertation. The Literature Review begins by discussing selected research on sense of place and the utilization of Instagram as a participant-generated image (PGI) approach to understanding people's immediate perceptions. This is followed by a review of recent literature on the characters of user-generated content (UGC) and hashtags, as well as urban space and cities in the digital environment. In the Methodology chapter, the research design and process used to conduct this study are described. This chapter provides a detailed description of research questions, sampling population, data collection, and coding procedure. Also, codebooks for categorization of people's photographic content and hashtags are described. The Results chapter reports the results of a set of chi-square analyses that correspond to the research questions. The Discussion provides an examination of the research findings and comparison with other findings from the literature. Finally, the Conclusion chapter summarizes significant research findings and suggests research implications and future research.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Thanks to rapid technological advancements and the continued spread of mobile devices, the boundary between the *real world* and *cyberspace* has begun to fade, leading to an increased convergence between online and on-site perceptions of urban public space (Heyd & Puschmann, 2017). As the sum total of many impressions, the image of the city is built on interrelated perceptions, feelings, and beliefs that its residents and visitors hold about the places within it. Online user-generated content (UGC) given by people to urban public space provides new opportunities for navigating a collective sense of place in the digital sphere. Particularly, photo-sharing social media platforms that collect visual evidence of on-site perceptions have so far received marginal attention in literature compared to text-based social media platforms.

This chapter is divided into three main sections. The first explores the concept of sense of place, including terminology applied across various fields of study. The second section discusses the participant-generated image (PGI) approach to content analysis and the utilization of geo-referenced user images and hashtags on Instagram as a PGI approach. Section three explores the current role of UGC in sense of place for urban public space and the identity of the city as a whole in the digital sphere.

2.1 Elements of Place

The topic of place has been studied through a variety of disciplines, including geography, sociology, and environmental psychology. Within the academic literature, place has been identified in many different ways. While each discipline takes a different approach to understanding place in all its various aspects, they exhibit some similarities in their understandings of the essential components of place. These include *form* as a

behavior setting and *activity* and *meanings* given to this activity by individuals or groups of people (Steele, 1981; Relph, 1986; Canter, 1996). Places are often recognized as material structures which can embody human activities. As seen in Table 2.1, scholars have considered both physical attributes and human activities to be major components of a place; for instance, Relph (1986) sees physical setting, activity, and meanings as the constituent parts of a place. Similarly, facet theory as advanced by Canter (1996) views a place as an interrelated complex of physical attributes, actions and concepts. Cresswell (2009) emphasizes *practice* as one of three essential elements for the formation of place, along with *materiality* and *meaning*. Likewise, Lefebvre (1991) sees space as a social product created by human activity rather than as a purely physical phenomenon. As the perception of a place is the result of the interplay between an individual's subjective understanding and the environment, a person's demographic characteristics such as gender, age, religion, education or nationality could be salient factors in forming the meaning of place. For instance, Dwyer (1994) found age to be an important factor in activity participation and preference; Zhang and Gobster (1998) also emphasized that the biggest differences in activity preference were dictated by age.

The interactions of humans with their environments, and the visible attributes and invisible qualities created through these transactions, have been extensively studied by scholars from across the relevant disciplines.

Table 2.1 The major components of a place

Relph (1986)	Canter (1997)	Roger Baker (1968)	Markus (1982,1987)	Gieryn (2000)	Cresswell (2009)
Physical setting	Physical attributes	Physical milieu	Form	Geographic location	Materiality
Activities	Actions	Recurrent activity	Function	Material form	Practice
Meanings	Concepts	A time period	-	Meaning and value	Meaning

Berque's approach sees the coexistence of aspects as quantitative and qualitative. Every place necessarily possesses a part, which is both material and measurable, and therefore commensurable with other sites.

> "This qualitative dimension is alike to the Aristotelian *Topos* and Heidegger's *Stelle*: as for the container, it is the external limit of a thing in the universal space of an objectified environment. On the other hand, place is related no less necessarily to an immaterial, phenomenal and semantic – non-measurable – dimension, and thus cannot be compared to other places. This qualitative and unique dimension makes it similar to Plato's *Khora* and Heidegger's *Ort* (Heidegger, 1962): it is the condition of existence of the thing within the sensitive world. These two aspects are combined trajectorively in the ecumene reality: every place is not only a topos, but also a khora, and vice versa." (Sepe & Pitt, 2014, pp. 215-216)

2.2 Space and Sense of Place

> "What begins as undifferentiated space becomes place as we get to know it better and endow it with *value*." (Tuan, 1977, p. 6)

While *sense of place* has no universally agreed-upon definition, the view of Tuan in *Space and Place* (1977) highlights the shared concept of how *space* is transformed into *place*. Tuan synthesizes the definitions of meanings, beliefs, symbols, values, and feelings of individuals or groups under the concept of *sense of place*. The invisible *value* created through interactions between human beings and their social settings is key to understanding the human-environment relationship.

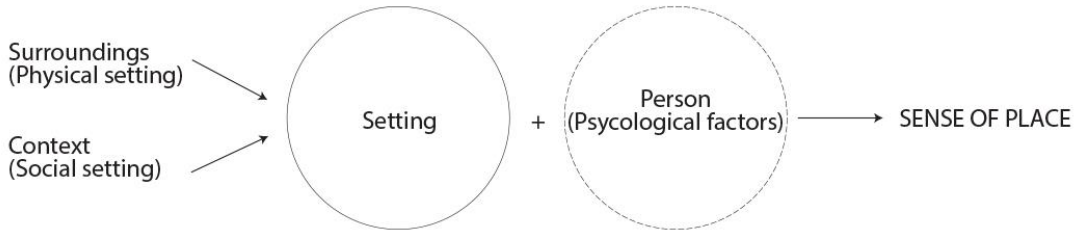

Figure 2.1 The sense of place (Adapted from Steele, 1981, p. 12).

As shown in Figure 2.1, Steele (1981) conceived of *sense of place* as the set of interactions between settings and personal and psychological aspects that an individual brings to them, whether consciously or unconsciously. Steele described nine types of place

experiences that can be investigated to understand a sense of place: 1*) immediate feelings and thoughts,* 2) *views of the world*, 3) *occupational experiences*, 4) *intimate knowledge of one spot*, 5) *memories and fantasies*, 6) *recognition or newness*, 7) *personal identification with someone's spot,* 8) *sense of accomplishment or blockage caused by the setting*, and 9) *sense of enjoyment, fun, or displeasure* (p. 12). A wide range of experiences can factor in the transition of a space to become one's place; they can involve objective or subjective information, prompt feedback or deeply rooted values, cognitive or affective aspects, personal or societal perspectives. A place without these values is just a *space*: "*placeless*" (Brandenburg & Carroll, 1995, p. 385).

> "[T]he ideas *space* and *place* require each other for definition. From the security and stability of place we are aware of the openness, freedom and threat of space, and vice versa. Furthermore, if we think of space as that which allows movement, then place is pause; each pause in movement makes it possible for location to be transformed into place." (Tuan, 1977, p. 6)

As Tuan notes, there are fundamental components of place: *space* as physical setting, *movement*, and *time* which allows the movement. Space and place condition each other; as time passes, movements bridge space and place. Time and continuity have been important themes in understanding this multifaceted concept in relation to an individual's sense of place towards a particular space. This is explicit in the *life path* theme, in which places become connected to the life path of the individual through origin, length of residence, important events or life stages, or frequent visits. Le Compte emphasized *a time period*, a *sequence* or *recurrent* patterns of activity that create "spatial and temporal boundaries in a symbiotic relationship" (1974, p. 184). Gustafson (2001) also stressed that "a meaningful place must appear an identifiable, and distinguishable territorial unit" (p.13). Place-related distinctiveness is not only an important aspect of *self*-related

meanings of place (Twigger-Ross & Uzzell, 1996) but also *society*-related meanings (Gustafson, 2001).

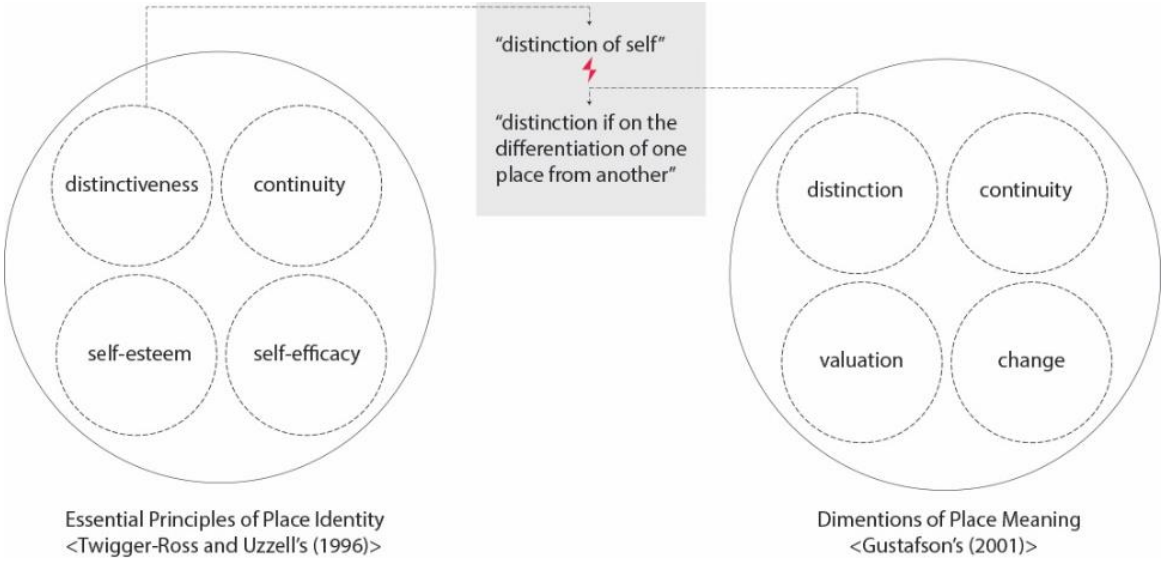

Figure 2.2 Different approaches and dimensions of *place*.
(Adapted from Twigger-Ross & Uzzell, 2014; Gustafson, 2001)

According to Hay (1998), the simple interest in place attachment has evolved into a complex set of meanings, attitudes, and experiences (Berkley et al., 2007). Consequently, researchers have begun to offer multi-dimensional definitions to try to understand the relationships between human beings and their immediate environment (Scannell & Gifford, 2014). For instance, environmental psychologists and others derived the concept of *place attachment* from interpersonal attachment theory, and this is now one of the most widely discussed concepts in the study of sense of place. Since the mid-1900s, behavioral scientists have studied person-place bonds with more systematic approaches (Fried, 1963). The most studied concepts of *sense of place* and *place attachment* will be discussed in depth in the following section.

2.2.1 Ambiguity of Terminology

As mentioned in the previous section, while the concept of *sense of place* has been emphasized in both academia and practice, no widely accepted definition of sense of place has emerged. However, a wide of range of visible factors and invisible values have been involved in the formation of sense of place through their complex associations and repeated human activities. In human geography, the term *sense of place* encompasses all subjective meanings that become attached to a place (Cresswell, 2006). Also, much of the literature that focuses on people's emotional relationships to places has roots in phenomenology (Bachelard, 1969; Relph, 1976). The *value* of a place is more difficult to describe due to the different terminologies that various theoretical bases use to conceptualize it (Hidalgo & Hernández, 2001). These include *topophilia* (Tuan, 1974), *place bonding* (Relph, 1976), and *place attachment* (Gerson, Stueve, & Fischer, 1977). Davis (2016) argues that *place bonding, rootedness* to place, *place dependence*, and *place identity* contribute to a person's relationship with their environment. Cross (2001) connects *place attachment* with the terms *topophilia*, *insidedness*, and *community sentiment*. Researchers Brown and Werner (1985) consider *place attachment* and *place identity* to express the same concept and use both terms synonymously. Mihaylov and Perkins (2013) propose that *place attachment* can be considered a subject in understanding a *sense of a place* in an effort to clarify the stages of identification, interpretation, and evaluation associated with a place.

As shown in Figure 2.3, any correlation between two or more concepts, whether at an individual or societal level, featured in the framework created by Mihaylov and Perkins (2013) can also become an element of *sense of place.* Brandenburg and Carroll (1995) argue that most of contemporary place research has focused more on the micro-scale of the individual than less-recognized "views of human culture and character as the direct

result of a particular place" (p. 385). This cultural influence is particularly critical in understanding *sense of place* in the digital environment created through diverse social media applications, each with its own culture and characteristics.

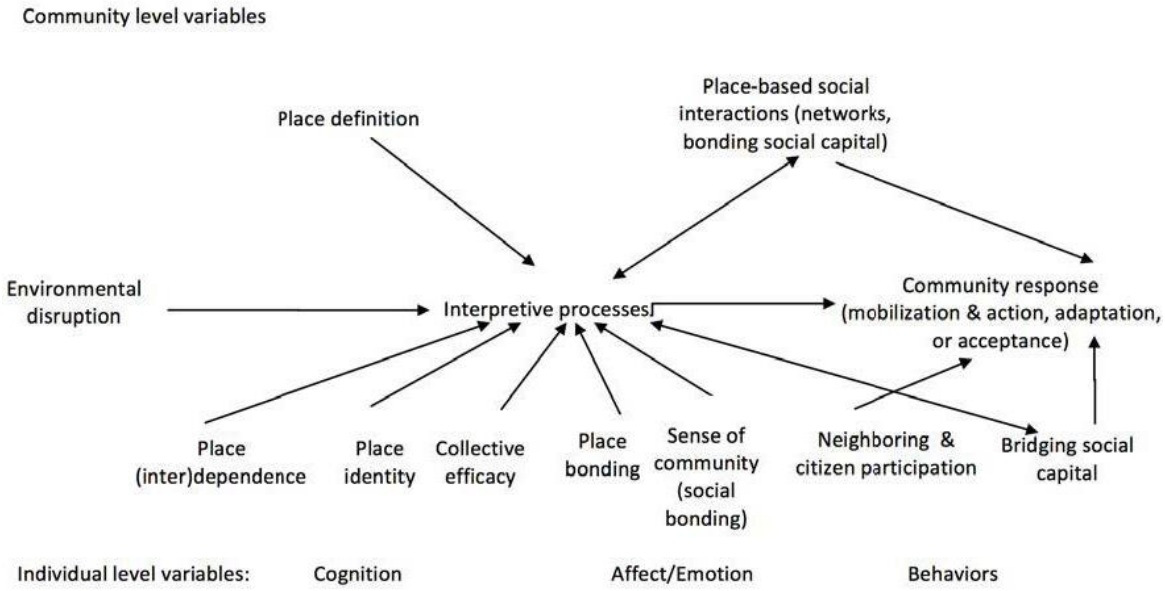

Figure 2.3 A framework of individual and community place attachment (Mihaylov & Perkins, 2013, p. 64).

In order to discuss the commonalities and diversity among various interpretations of *sense of place*, Cross (2001) referred to definitions taken from five different bodies of literature as follows: 1) anthropology, 2) environmental psychology, 3) geography, 4) landscape architecture/history, and 5) sociology. While all disciplines emphasize subjective or cultural perceptions of a particular space to a greater or lesser extent, the primary focus of research differs across disciplines based on perspectives: some focus on the relationships between people and their environment—*place attachment, topophilia, sense of place* (Jackson, 1994; Hummon, 1992)—while others focus more on place itself: the visible and invisible aspects endowed or perceived by people, spirit of place and sense of place (Steele, 1981), from prompt/temporal feedback to deep-seated meanings created over time.

Table 2.2 Various definitions related to sense of place (Cross, 2001, pp. 1-2)

Field of Study	**Terminology**	**Author**	**Definition**
Anthropology	Place Attachments	Setha Low (1992)	"*Place attachment* is the symbolic relationship formed by people giving culturally shared emotional/affective meanings to a particular space of piece of land that provides the basis for the individual's and group's understanding of and relation to the environment.... Thus, place attachment is more than an emotional and cognitive experience and includes cultural beliefs and practices that link people to place."
Environment Psychology	Sense of Place, Spirit of Place	Fritz Steele (1981)	"*Sense of place*: the particular experience of a person in a particular setting (feeling stimulated, excited, joyous, expansive, and so forth)." "*Spirit of Place*: the combination of characteristics that gives some locations a special 'feel' or personality (such as a spirit of mystery or of identity with a person or group)."
Geography	Topophilia	Yi-Fu Tuan (1974)	"*Topohilia* is the affective bond between people and place or setting. Such ties vary in intensity, subtlety, and mode of expression. Responses to the environment may be aesthetic, tactile, or emotional."
Landscape Architecture/ History	Sense of Place	John Brinckerhoff Jackson (1994)	"A sense of place is something that we ourselves create in the course of time. It is the result of habit or custom… A sense of place is reinforced by what might be called a sense of recurring events."
Sociology	Sense of Place	David Hummon (1992)	"By sense of place, I mean people's subjective perceptions of their environments and their more or less conscious feelings about those environments. Sense of place is inevitably dual in nature, involving both an interpretive perspective on the environment and an emotional reaction to the environment… Sense of place involves a personal orientation toward place, in which one's understanding of place and one's feeling about place become fused in the context of environmental meaning."

To highlight the complexity of the concept, Cross discusses two aspects in understanding the most popularized concept, *sense of place*. The first aspect is "*relationship to place"* (p. 3), which is one of six ways in which people form bonds with places: 1) biographical, 2) spiritual, 3) ideological, 4) narrative, 5) commodified, and 6)

dependent. As seen in Table 2.3, the relationships between an individual and a place are affected by the individual's subjective experiences, values and intention for their existence in relation to the place. In the study by Cross (2001), the *biographical* relationship was revealed as the strongest and most enduring between personal history and place. Meanwhile, the c*ommodified* relationship was the least relevant to personal history; rather, the relationship refers to cognitive and physical aspects of an individual's ideal or desirable place. A person can be tied to a particular place physically and/or psychologically to a greater or lesser degree, and the relationships are also influenced by one's identity formation, including the development of values, ethics, preferences, or even political stances. Cross also highlights the fact that people tend to have more than one relationship with a particular place, and that these relationships change over time.

Table 2.3 Relationships of people to place (Cross, 2001, p. 3)

Relationship	**Type of Bond**	**Process**
Biographical	Historical and familial	Being born in and living in a place; develops over time
Spiritual	Emotional, intangible	Feeling a sense of belonging, simply felt rather than created
Ideological	Moral and ethical	Living according to moral guidelines for human responsibility to place; guidelines may be religious or secular
Narrative	Mythical	Learning about a place through stories, including creation myths, family histories, political accounts, and fictional accounts
Commodified	Cognitive (based on choice and desirability)	Choosing a place based on a list of desirable traits and lifestyle preferences; comparison of actual places with ideal
Dependent	Material	Constrained by lack of choice, dependent on another person or economic opportunity

The second aspect is "community attachment" (p. 3), which can be illustrated by "a person's level of attachment, identification and involvement with the community, past experiences and future expectations, and their assessment of the place" (p. 4). While community refers to people who share some common concern, whether on the basis of

where they live, of similar interests or affiliations, or of a relationship that have some cohesion or continuity (Checkoway, 1997), Cross explores a person's *community attachment* particularly in relation to a sense of place situated in a given geographical area. The aspect will be further discussed in relation to the concept of *place attachment* in the next section.

In the following sections, two concepts, place attachment and place identity, will be reviewed along with the varied terms mentioned above, in order to discuss a collective sense of place in the digital sphere. First, place attachment, or the emotional bonds formed through experiences and relationships between human beings and places, will be discussed as one of the most important research subjects in environmental psychology. Second, place identity, or values assigned through transactions and experiences, will be discussed.

2.2.2 Place Attachment

As the most popularized view of *sense of place* in contemporary place theory, *place attachment* has been studied extensively. Place attachment is considered to be a complex set of feelings that individuals form for specific places (Kyle et al., 2005; Marzano, 2016). More specifically, it refers to the phenomenon of human-place bonding or the positive or negative bonds that develop between groups or individuals and their environments (Altman and Low, 1992; Relph, 1976; Williams et al., 1992). The emotional bonds toward place gained more popularity among humanistic geographers and sociologists in the 1970s; Tuan's philosophical approach, known as *topophilia* (1974) and Relph's phenomenological approach (1976) emphasized subjective place experience, emotional ties and meanings given by individuals. In anthropology, place attachment is viewed as the symbolic relationships formed between people and the way they culturally

relate to their environment; in this field, place attachment links people to a place through shared cultural beliefs, practices and cognitive experiences (Low, 1992).

Early research on place attachment focused on its positive effects. In recent decades, scholars have sought a broader understanding of emotional relationships to places that incorporates negative emotions, which could include feelings of ambivalence, stress, or trauma (Howard, 1993; Manzo, 2003). Giuliani and Feldman suggested that conceptualizing relationships to place as *attachment* has made understanding negative experiences particularly challenging. As an example, they give the places where leaders of the Nazi party were active in the 1930s. For the Jewish people who experienced profound hardship in those locations, would the term 'attachment' be the best to describe their relationships to those places? (1993). How about 'home' for victims of domestic violence? Relph (1985) also argues that "relationships to places need not be strong and positive" (p. 27); some locations may have positive associations or *topophila*, and other places may carry a negative connotation or *topophobia* (Relph, 1985). It is necessary to take an integrated approach to the different intensity and directionality of emotional expression formed by people towards a particular space.

Table 2.4 Sense of place typology (Cross, 2001, p. 9).

Sense of Place	**Satisfaction**	**Home as Insidedness**	**Local Identity**	**Type of Attachment**	**Future Desires**
Rootedness Cohesive	High	Here (physical, spiritual, emotional)	Strong	Biographical Spiritual Ideological	Continued residence
Rootedness Divided	Variable	Here and there (physical, spiritual, emotional)	Split	Biographical Spiritual Dependent	Variable
Place Alienation	Low	There (physical, spiritual, emotional)	Weak	Dependent	Desire to leave, but unable
Relativity	Variable	Anywhere	Moderate	Commodified (Biographical) (Dependent)	To live in ideal place, wherever that may be
Uncommitted Placelessness	(Moderate)	Anywhere/ nowhere	Weak	None	No specific expectation of place

In addition to the six types of bonds associated with the relationships discussed in the previous section, Cross (2001) uses "*community attachment"* (p. 3) to indicate the depth and types of attachments to places; a person's attachment to a place can fall into five levels, or categories: *ideological rootedness, taken or granted rootedness, place relativity, place alienation*, and *placelessness*. For instance, the first type, *rootedness*, the strongest type of attachment, is closely related to the *biographical* relationship. On the other hand, the *relativity* refers to an individual's multiple attachments to many places, which can be formed anywhere around the world, rather than a strong attachment to only a single place. Because each type of *sense of place* is associated with one or multiple attachment types, as seen in Table 2.4, the *values*, or *sense of place*, can encompass multiple types of relationship, each at a different scale and with different levels of satisfaction, number of locations, and intensity. These factors have strong effects on future desire for a particular place; however, they cannot be simply examined through a causal relationship because of the complexity of the creation of sense of place.

In terms of the components of *sense of place* and interconnection between those factors, a growing body of literature has proposed a number of ways to study them. For instance, Mihaylov and Perkins (2013) suggest that *place attachment* is a key idea in understanding *sense of place*, which involves the stages of identification, interpretation, and evaluation associated with a place. They conceive of *place identity* as a subset of *place attachment*, while Ruiz, Hernández and Hidalgo (2011) reveal the high correlation between *place attachment* and *place identity*. This correlation often hinders conceptual differentiation between the concepts by reinforcing the factorial structure of the neighborhood attachment and neighborhood identity. More recently, Hernández et al. (2014) summarized a substantial number of different frameworks of the terminologies in relation to *sense of place* by reviewing the literature from 2010; as seen in Figure 2.4,

many scholars (e.g., Fornara et al., 2010; Devine-Wright, 2011; Rollero & De Piccoli, 2010) consider *place attachment* a one-dimensional phenomenon on the same level as *place identity* and other place constructs as seen in Model 1, one-dimensional concept. As shown in Models 2, multidimensional and Model 3, superordinate concepts, other researchers have considered *place attachment* as a superordinate concept with a multi-dimensional construct (e.g., Scopelliti & Tiberio, 2010; Lewicka, 2011) or a subordinate concept (e.g., Droseltis & Vignoles, 2000). The extensive interconnectivity of varied concepts related to *sense of place* and *place attachment* reflects the complexity of the creation of values between people and their environments.

In order to understand the shared image of urban public space on the current digital era, this study considers *sense of place* as a superordinate concept. Although the intensity of emotional connections, knowledge and beliefs, and behaviours and actions in reference to a place can differ, an individual geo-referenced to urban public space with varied subjective experiences and meanings will be equally worth understanding in a collective sense of place. The major components of a place (Relph, 1986; Canter, 1997; Baker, 1968; Markus, 1982; Gieryn, 2000; Gresswell, 2009) will be utilized in developing main categories for categorizing user-generated visual content in urban public space. The distinct features and different types of emotional bonds developing through the constant interplay of cognitive and affective experience on UGC presented in urban public space will be considered. Given the highly mobile environment facilitated by technological advancement, this study considers people could have multiple relationships to many places in the world. Overall, the user's content geo-referenced to urban public space on a particular social media application, Instagram will be interpreted as a subset of an overall sense of place in the current digital age.

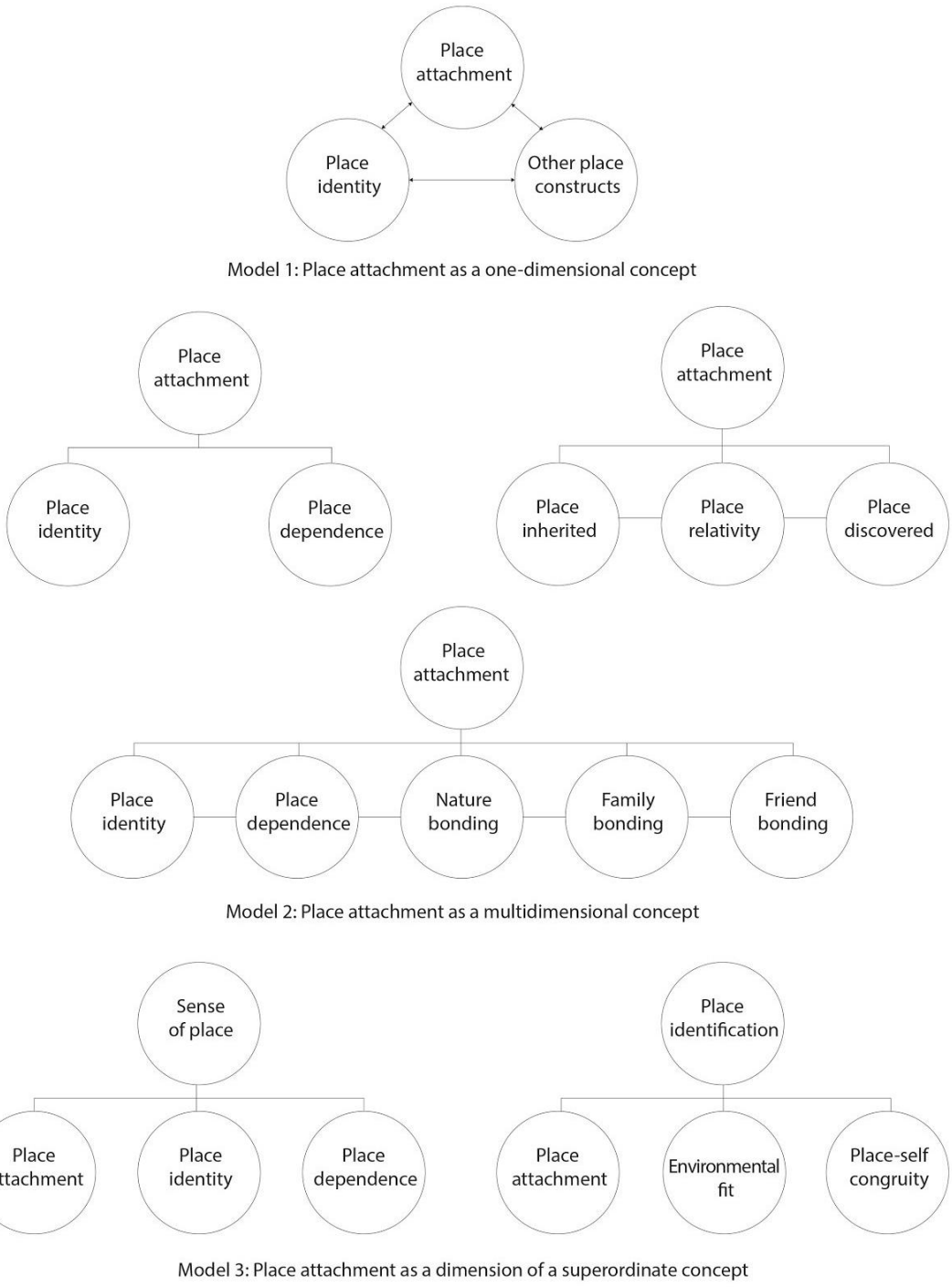

Figure 2.4 Three different models of place attachment (Adapted from Bernardo et al., 2014).

2.2.3 Place Identity and the Extended Self

Unlike the term *place attachment*, which encompasses all types of affective bonds with specific areas, *place identity* offers differentiated information in understanding an overall sense of place for urban public space by analyzing user-generated content (UGC) through social media platforms; literature provides diverse interpretations of the concept of *place identity*, particularly in relation to *self-identity* and *commodification* of place.

> "What kind of place is this? It depends on whom you ask." (Steele, 1981, p. 4)

As noted by Steele in *Space and Place*, place can be recognized by various intersectionalities such as sex, age, race, education, socioeconomic status, and social descriptors of an individual. These personal factors lead a person to form their own motivations, attitudes, and values, which, in turn, determine the quality of a specific place (Lang & Marshall, 2017). Erikson (1950) used the term *identity* to refer to an idea that others have termed *self-concept*. It refers to a person's cognitive system, including "content, attitudes, or evaluative judgments" (Oyserman et al., 2012, p. 5) which make up one's sense of basic worth (Oyserman & Markus, 1998). An individual's self-identity is closely tied to the creation of *place*, and vice versa. Droseltis and Vignoles (2009) propose four major dimensions in trying to understand place identity in relation to self-concept. As shown in Figure 2.5, the first dimension carries the notion of *extended self*, or the idea that places are experienced cognitively as *part of the self*. The second dimension represents the idea of *ecological self* or *environmental identity* and refers to individuals developing a subjective sense of being part of their physical environment. The third dimension considers the level of congruity between self and place, in which place is evaluated in terms of its consistency with the values and personality of the individual. Finally, the fourth dimension conceptualizes place identity as level of attachment (p. 24). In the digital

environment, the first dimension, *self-extension*, gives insight into understanding user-generated content from urban public spaces through users' social media profiles.

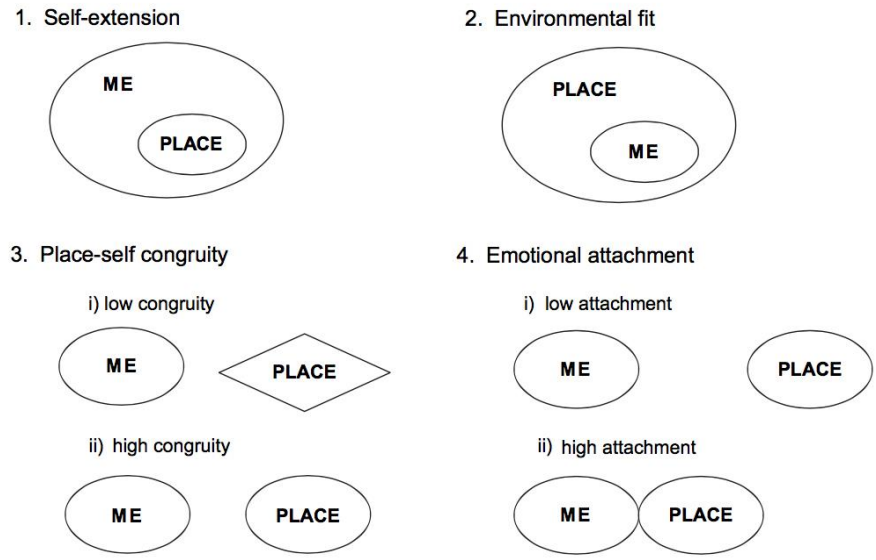

Figure 2.5 Four Theoretical Dimensions of Place Identification (Droseltis & Vignoles, 2009, p. 24)

The *extended self* is the type of self-concept in which certain symbolic objects or physical possessions, such as cars and houses, convey one's self-identity (Belk, 2016). The scope of the extension of self-identity can go beyond physical expression; cultural activities, interests, achievements, skills, hobbies, or even certain places we frequent can also signify an individual's life (Doster, 2013). As such, thus those symbolic resources can be manipulated to develop an individual's self-identity as with *self-expressive* values.

In "Extended Self and the Digital World," Belk (2016) argues that Web 2.0 has offered people various methods of self-presentation, and it is essential to understand the effect of digital affordances on the formation of the extended self. As seen in Table 2.5, Belk identifies three aspects that must be considered with the new phenomena: *de-materialization, re-embodiment,* and *co-construction of self*. *De-materialization* refers to the vulnerability brought by intangible tools that tend to be "less secure, meaningful, and authentic than tangible equivalents" (p. 51) and give users less control over their contents.

Re-embodiment suggests that patterns of user behavior in the digital sphere reflect an individual's personality on social media platforms with a certain level of accuracy (Back et al., 2010). It should be noted, however, that other researchers have revealed a tendency of people to represent themselves as more "ideal self than actual self" (Belk et al., 2016, p. 51). The last and most important aspect of extended self on social media is the *co-construction of self*, highlighting the significance of others' reactions. The extended self in the virtual environment is built on the integrated image from the continuous process of interactions between an individual's self-concept and the reactions of others, such as comments, likes, taggings, or any types of feedback associated with the self-image (Belk et al., 2016).

Table 2.5 Digital modifications of the extended self (Belk, 2016, p. 52)

Digital Dimension	**Self**	**Possessions**
Dematerialization		Attachment to and singularization of virtual possessions; almost, but not quite the same
Re-embodiment	Avatars affect offline self; multiplicity of selves	Attachment to avatars
Co-construction of self	Affirmation of self; building aggregate extended self	

The meaning of place identity can span from one's home and immediate surroundings to their neighborhood, city, or continent. An individual's place identities can overlap and interpenetrate one another and are wide open to a variety of interpretations (Donat, 1967). According to Gustafson (2001), the meaning of place is "often situated in the relationship between self, others and/or environment" (p. 9); three major types of meaning identified by Gustafson are 1) self, personal meaning; 2) self-others in relation to friends, acquaintances, relatives living in the place; and 3) others, without any social relations, that are associated with the formation of meaning of place (Gustafson, 2001). As seen in Figure 2.6, internal and external factors of *self*, *environment*, or *others* can influence the formation of the different levels of place identity.

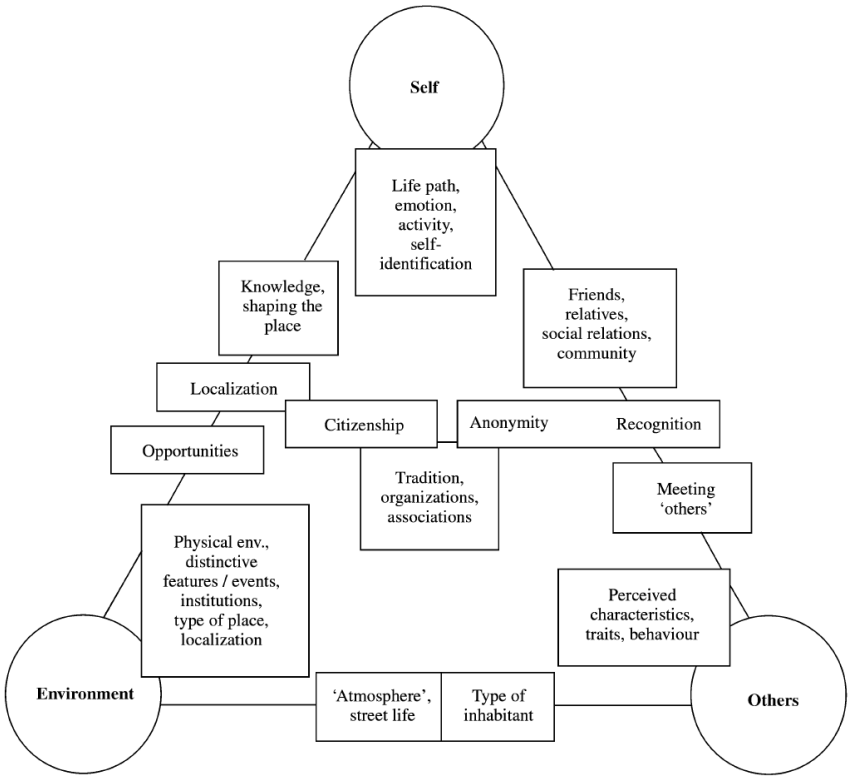

Figure 2.6 Meanings of place spontaneously attributed by respondents (Gustafson, 2001, p. 10).

Another concept of *place identity* is rooted in corporate communications literature and can be applied to places in advanced capitalist cities and in the digital environment. Public spaces have "become increasingly complex, … more explicitly experiential, cosmopolitan, commercial, and commodified" (Madden, 2010, p. 187). In corporate communication strategy, *identity* refers to the formation of cues which stakeholders can capitalize on through recognition, identification, and organization (Fill, 2005; Dowling, 2001; Olins, 1989). This aspect can be seen through the commodification of public spaces to achieve certain purposes, such as in profit-making ventures of privately owned common spaces (Kohn, 2004); the privatization of the management of *public* parks has drawn criticism among urban scholars, yet this trend continues to accelerate in capitals all over the world.

The goal-oriented nature of the formulation of place identity is not limited to commercial purposes; it also provides an insight into the creation of an individual's digital identity through social media outlets. Particularly, the *place entity* model proposed by Marzano (2016) helps bridge the varying and complex understandings of *place identity* on social media platforms from this commodified point of view. Marzano argues that *place entity* is a complex phenomenon which includes physical and social attributes such as individual and collective meanings, knowledge, and experiences; *place entity* is the result of irregular interactions among human beings in particular physical and social settings. In this model, *place entity* properties are characterized as continuously evolving through the influence of human beings, particularly stakeholders. This process gives insight into user-generated content as a means of forming one's self-identity through one's social media profiles in the digital sphere. As a result of the process, *place identity* could be conceptualized from selected, reshaped, and attuned properties for one's underlying intentions. However, Marzano (2016) argues that *place identity* is influenced not only by stakeholders and their social settings (which include virtual images, impressions, etc.) but also by external factors such as positive or negative feedback through electronic word of mouth (eWOM) circulating on the Internet.

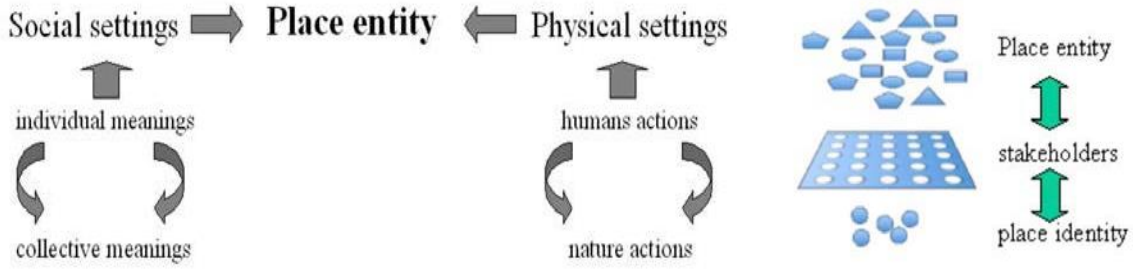

Figure 2.7 Place entity (left), Place identity process (right) (Marzano 2016, p. 46).

2.3 Photo-Based Methods for Understanding Place

> "… before the invention of photography, the concept of world, humanity, flora, and fauna was often a fantastic one. That is why the camera with its impartial vision has been, since its inception, a clarifier and a modifier of ecological and human understanding." (Collier & Collier, 1987, p. 8)

The camera, by affording an accuracy unmatched by any other research instrument, has been an essential tool in gathering visual information for nearly every field of study (Collier & Collier, 1987). While in the early stages of visual research the camera was utilized to gather descriptive details, modern researchers analyze photographs more "as illustrations, perhaps feeling that the overload of photographic detail interferes with more controlled analysis" (Collier & Collier, 1987, p. 10). The camera can be a highly sensitive tool for gathering the attitudes and stances of research subjects, but photographs also offer more specific information about "qualifying and contextual relationships that are usually missing from codified written notes" (Collier & Collier, 1987, p. 10). Howells (2002) argues that a photograph can provide three kinds of visual evidence: its subject matter; the reflection of the individual photographer's view; and the collective worldview, including social values, beliefs or attitudes, of the larger social group that the photographer belongs to. The use of visual research methods has been on the rise since the 1970s across various fields of study, including anthropology, psychology, sociology, landscape planning, tourism and urban studies. Along with this increase in visual research methods has come a diverse terminology developed by different disciplines to refer to participant generated image (PGI) research approaches. Balomenou & Garrod (2016) conducted a systematic review of 300 research studies and found a variety of terms in PGI methodology, including *photovoice* (42%, n=120), *autophotography* (12.9%, n=39), *photography* (9.4%, n=27*), visitor-employed photography* (4.2%, n=12), *photo-elicitation* (3.1%, n=9), and *participatory photography* (3.1%, n=9).

The advent of the phone camera has had its own profound impact on people's relationship to their environment over the last two decades. As they have gained the ability to record all aspects of everyday life, the boundaries between living and recording have faded. Rubinstein & Sluis (2008) describe how the ubiquity of cameras has changed people's relationship with space by transforming everything they see into subject matter for photos. This phenomenon has had a substantial impact on how people form memories, experience events, and communicate with others and the environment. The number of photos taken every two minutes today is greater than the number of photos taken throughout the entire 19th century (Cooke, 2020), and this number continues to increase at a ferocious rate as communication technology advances.

The explosive increase in the number of photographs available on social media platforms offers new opportunities to study the dynamic way in which sense of place is formed today. User-taken photographs available on photo-shaing social media platforms can help to explore the essential principles of place hightlighted in the literature, such as continuity, distinctiveness, and changeability (Twigger-Ross & Uzzell, 2014; Gustafson, 2001), as they relate to a particular urban public space by illuminating the subjective perceptions of the people who are experiencing it.

2.3.1 Participant-Generated Image (PGI) Methodology

With its varied ways of garnering visual materials for study, participant-generated image (PGI) methodology has taken its place as one of the most important research trends for understanding the relationship between people and places. Matteucci (2013) describes how photographs are frequently used in place research and often sorted into four different types: "1) produced by the researcher, 2) gathered by the researcher, 3) produced by the research participants, or 4) gathered by the research participants" (p. 3). Types 3 and 4 in

particular have been considered primary data to identify residents' or visitors' perceptions of public spaces by some social researchers (e.g. Garrod, 2008; Kerstetter & Bricker, 2009; Liesch, 2011). Heisley and Levy (1991) termed this active and creative participation "autodriving," referring to research that is "driven by informants who are seeing their own behavior" (p. 261).

Urry (1995) identifies three primary advantages of the PGI approach: "1) photos can provide tangible stimuli for more effectively tapping into informants' tacit, and often unconscious, consumption of representations, images, and metaphors, 2) produce different and richer information than other techniques, and 3) may also help to reduce differences in power, class and knowledge between researcher and researched" (p. 373). The PGI approach thus helps reduce researcher bias in the selection of a sample of photographs, which may arise in non-participant-generated visual samples due to the subconscious prejudices of the researcher (Collier & Collier, 1987). Nonetheless, Stedman and his colleagues noted that studies still had "rarely offered research participants the opportunity to take their own pictures to communicate their experiences and symbols" (p. 114). The photoset for this research consists of user-taken photographs, which enables researchers to harness insider knowledge from "ordinary" people (Balomenou & Garrod, 2016, p. 338).

In terms of sample size for PGI methodology, the number of photographs taken from each participant affects the reliability of PGI studies, particularly when quantitative approaches are used (Balomenou & Garrod, 2016). One important requirement in any research is reliability, or "consistency, dependability and replicability" (Zohrabi, 2013, p. 259) of the results of an individual study. In their review of 286 studies published between 1977 and 2012, Balomenou and Garrod (2016) argue that recommendations for the number of participants involved varied widely; however, few researchers involved more than 100 participants. Specifically, more than half of studies involved less than 30

participants, while only 18 studies (6.3%) out of 286 included more than 100 participants, as seen in Table 2.6.

Table 2.6 Number of participants in PGI research (Adapted from Balomenou & Garrod, 2016, p. 343)

No. of Participants	No. of Studies	%
<10	49	17.1
10-19	73	25.5
20-29	30	11.2
30-39	22	7.7
40-49	17	5.9
50-99	28	9.8
≥100	18	6.3
Not specified	42	14.7
Other	4	1.7
Total	286	100

In addition, only 14 studies collected more than 1,000 photographs, while the majority of studies (77.3%) did not indicate how many photographs were used. This may be due to the dominant trend of qualitative approaches in PGI methodology, or it may be caused by limitations on the sample population that is affordable or accessible to a single researcher. The benefit of a large number of visitors' photographs available on social media is that it helps establish reliability, which enables the researcher to collect the perceptions and shared experiences of many people in urban public spaces.

Table 2.7 Number of photographs in PGI research (Adapted from Balomenou & Garrod, 2016, p. 343)

No. of Photographs	No. of Studies	%
<100	4	1.4
100-499	34	11.9
500-999	8	2.8
1000+	14	4.9
Not specified	221	77.3
Other	5	1.74
Total	286	100

The visual information produced or gathered by participants can be analyzed in various ways, including frequency-based quantitative content analysis and qualitative

approaches such as discourse analysis or mixed-method approaches (Balomenou & Garrod, 2016). Balomenou and Garrod also argue that researchers can achieve greater confidence in their validity through the process of triangulation of a mixed-method approach. Despite the merits of mixed-method approaches, however, the majority (71.3%) of studies using PGI in social sciences have employed only qualitative techniques, while only 12.2% used quantitative methods, according to a review of recent literature as shown in Table 2.8. Only 8% of the studies have utilized a mixed-method approach of both qualitative and quantitative statistics. For this study, both qualitative and quantitative techniques will be employed throughout the content analysis process, including data collection, categorization and statistical analysis.

Table 2.8 Method(s) of analysis in PGI research (Adapted from Balomenou & Garrod, 2016, p. 343)

Technique	**No. of Studies**	**%**
Qualitative only	204	71.3
Descriptive statistics	18	6.3
Advanced statistics and qualitative statistics	23	8.0
Advanced statistics only	17	5.9
Not specified	12	4.2
Other	12	4.2
Total	286	100

There are two different ways to perform content analysis on visual content. First, many software tools and other digital approaches have been adopted in content analysis. Several studies have used image analysis software like Adobe Photoshop to identify the physical content of landscape scenes in a small number of photos (Hagerhall et al., 2004). There have also been many initiatives to process so-called big data. In computer science, for instance, there have been intensive efforts to achieve human-level performance in image analysis through machine-learning algorithms. Technological advances continue to produce more and more impressive results, yet further development is still needed before

software can analyze complex images at the level of a human. For instance, Zhou, Lapedriza, Xiao, Torralba, and Oliva (2017) argued that any study using machine learning to analyze visual information must include enough samples to cover the diversity of each classification and have access to a training dataset (2017). They tried to analyze 10 million scenic photographs by labeling each as belonging to one of 476 scene semantic categories; despite the considerable size of their sample, they concluded that "they were able to reach near-human semantic classification of visual patterns, like objects and scenes through data-hungry machine learning. However, places of high-coverage and high-diversity of exemplars offers an ecosystem of visual context to guide progress on currently intractable visual recognition problems" (p. 12). In order to achieve accuracy in analyzing content of photographs of urban public space, therefore, it still requires significant manual efforts.

Several recent studies have sought ways to assure greater reliability in manual analysis of visual materials. For instance, Oteros-Rozas, Martín-López, Fagerholm, Bieling, and Plieninger (2018) collected a random set of user-taken photographs from two photo-sharing social media platforms, Flicker and Panoramio, to explore cultural ecosystem elements including *sense of place* and *local identity* at five European sites. In order to check the degree of subjectivity in the valuation and its applicability, they conducted their entire analytical process twice on the data. Similarly, Amsden, Stedman, and Kruger (2011), in their study of residents' photographs and in-depth interview to better understand *place attachment* in a tourism-dependent community, had two researchers independently analyze the photographs and interviews. In their findings, they describe some challenges of the process. For instance, many photos contained multiple elements or unclear representations of symbols, people or places. To create a single series of codes for analysis, the researchers engaged in discussions until consensus was reached. This research borrows from both studies mentioned above to check for consistency in the

application of the content analysis criteria. In addition to the primary reviewer, one other reviewer coded the selection of a random subsample of photographs independently. The geotagged Instagram images are analyzed and processed through categorical aggregation, which uses organizational techniques to label, code, and categorize qualitative data (Amsden et al., 2011).

2.3.2 Instagram as a PGI method

Instagram is a free photo-sharing application for mobile devices which enables users to take photos and videos, apply a selection of digital filters, and share them on the application itself or on other social media platforms (Alhabash & Ma, 2017). Instagram is a portmanteau of two phrases, *instant camera* and *telegram* (Lang, 2014), and people tend to use Instagram to store and share memories from past experiences or special moments (Sheldon et al., 2017) with friends, family or the general public (Hodson & Petersen, 2018). According to Sehl (2021), travel is the top interest of Instagram users among various subjects including music, food, fashion, or technology.

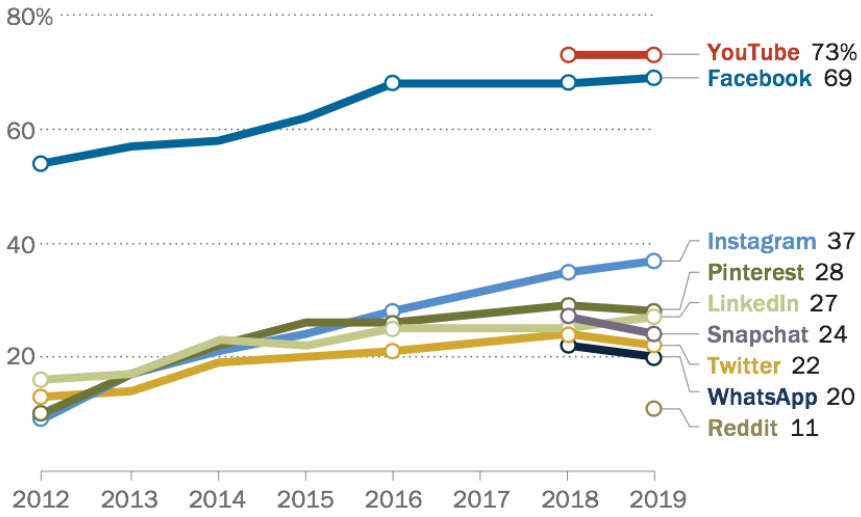

Figure 2.8 Percent of U.S. adults who have ever used various social media platforms. (Pew Research Center, 2019)

Since its inception in 2010, Instagram has rapidly grown into one of the most widely used social media applications in the world after Facebook and YouTube (Pew Research Center, 2019), as shown in Figure 2.8. Instagram currently has more than 1 billion monthly active users worldwide, over 120 million active users in the U.S. (Statista, 2019), and 95 million photos and videos shared each day (Lister, 2019). 63% of users log into the app each day, making it the second-most used social network after Facebook. As of February 2019, 37% of people in the United States use Instagram, with millennials forming a key demographic (Pew Research Center, 2019). Adult females were significantly more likely to use the platform at 43%, compared to just 31% of adult men. As shown in Figure 2.9, two-thirds of 18-to-29-year-olds utilized Instagram, along with 47% of the 30 to 49 age group. As the number of Instagram users in all age groups continues to grow, the usage of Instgarm among people aged 50 to 64 and 65+ reached 23% and 8% respectively (Statista, 2020).

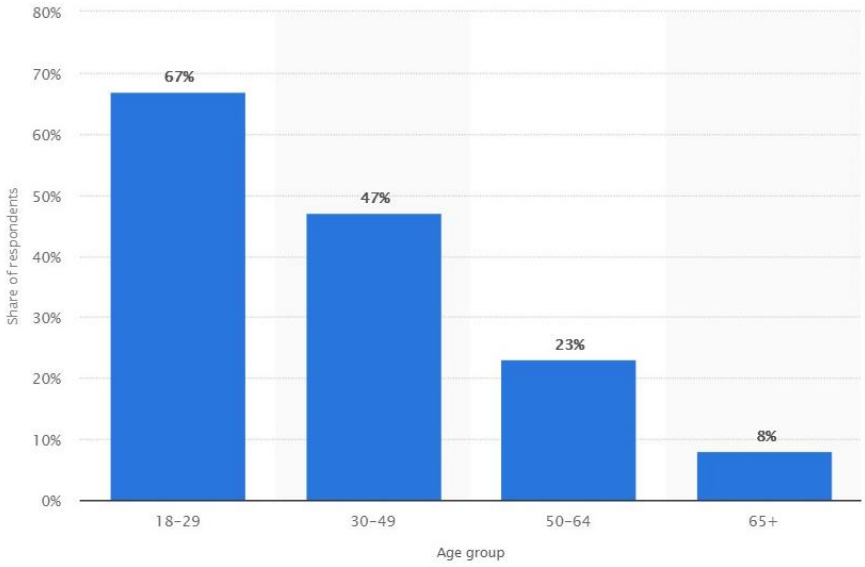

Figure 2.9 Percent of U.S. adults who use Instagram as of February 2019 by age group. (Statista, 2020)

The definition of Millennial, the main user group of Instagram, can vary but generally refer to those who were born between 1981 and 1997, as seen in Figure 2.10

(Pew Research Center, 2019). The population of Millennials in the U.S was 73 million in 2019, becoming the largest adult generation group with increasing number of young immigrants (Bialik & Fry, 2019). As a socially constructed concept, there is no exact boundary between the presented generations. People belonging to the same generation may share similar particular circumstances such as the computer revolution for Generation X and the internet explosion for Millennials (Dimock, 2019); the same generation may have faced similar life choices, opportunities, constraints and share socially-constructed habits, attitudes or cultures, yet not "all Millennials are the same" (Moos et al., 2018, p. 6).

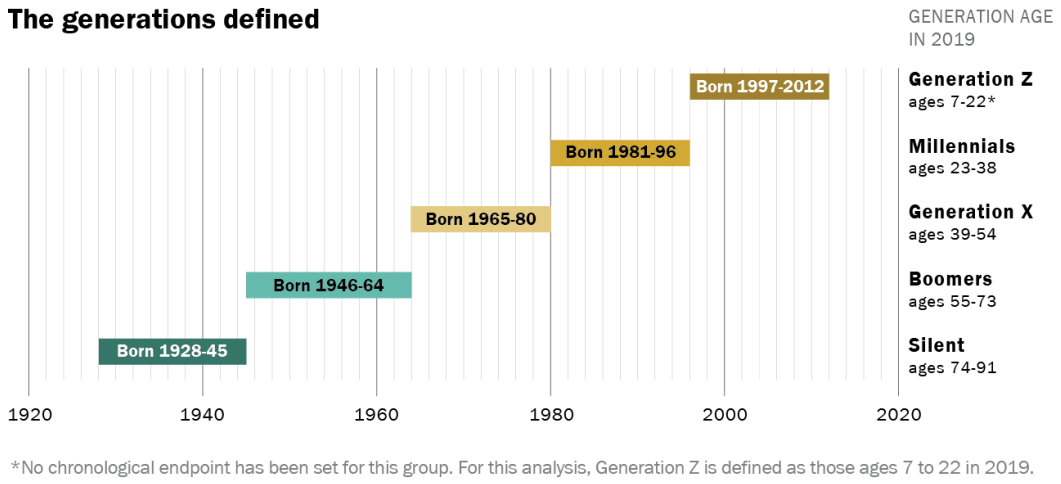

Figure 2.10. Definition of generation (Pew Researech Center, 2019)

Millennials are known to be empowered by the rapid technological changes in society (Dimock, 2019) and the young adults are better educated comparing with previous generations. The factor is strongly associated to one's financial well-being or employment (Bialik & Fry, 2019). As 43% of Instagram users in U.S are college graduates and 37% have some college level of education (Sehl, 2021), the user demographic of Instagram appears to have higher educational attainment than Millennials in general. The generation have also brought more socio-cultural diversity including racial and ethnic aspects to

American society (Bialik & Fry, 2019). The perspective for diversity between Millennials and the traditional view is different. Millennials highlight ‘acquired’ aspect of diversity including experiences, perspectives, or backgrounds. They emphasize that the differences that may help them bringing value, and a diverse and inclusive environment is essential for the generation. Contrary to the view of Millennials, older generations consider diversity as protection, as ‘inherent’ traits such as race, gender, ethnicity, or religion (Ann et al., 2013).

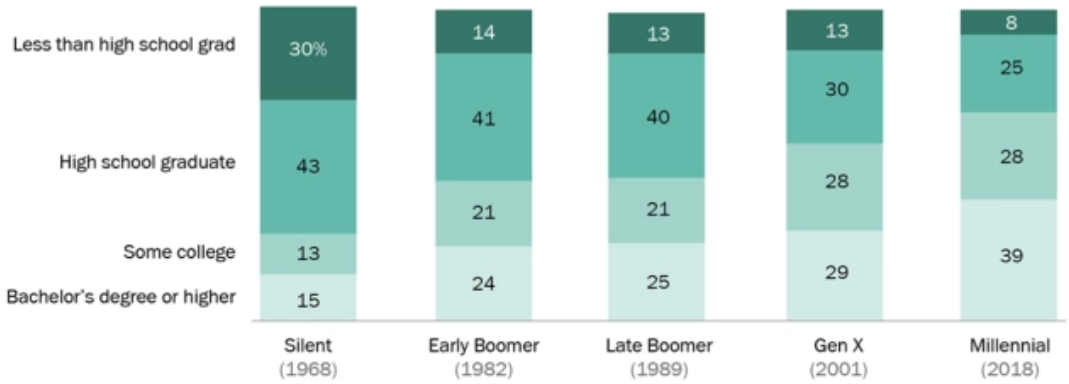

Figure 2.11 Educational attainment of 25-to 37-year-olds (%). (Pew Research Center, 2019)

Existing literature indicates that technological engagement and virtual connectivity strongly influence experience and interpretation of a place. The great incursion of technology may create added value and affective attachment to their environment through its cognitive stimulation and co-creation experience (Mohd et al., 2019) as seen in Figure 2.12. According to the study “Millennial Tourist Emotional Experience in Technological Engagement at Destination” by Mohd et al., (2019), there are two dimensions Millennial’s constant sharing of real-time experience online may influence experience development: “(1) sensory, affective and social experience and (2) cognitive and bodily experience, which reflecting the development of emotional connection with destination through the sole use of online source.” (Mohd et al., 2019, p.130).

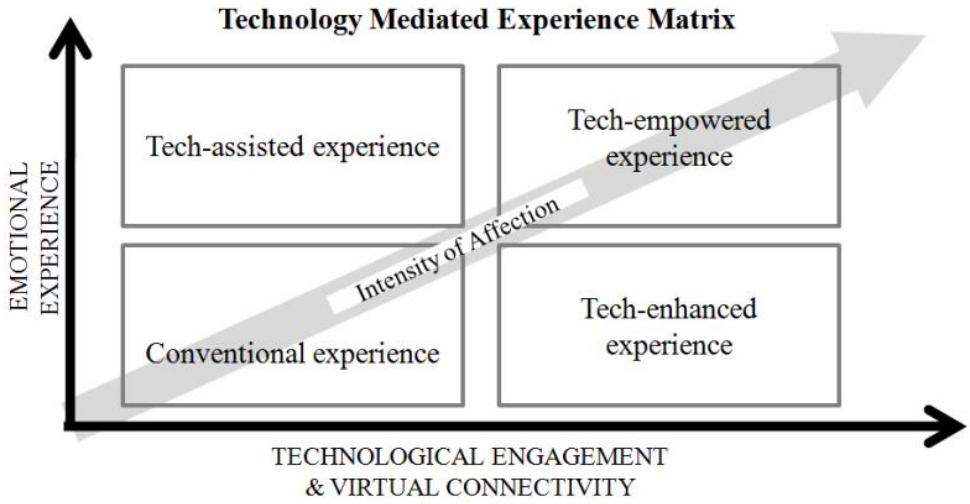

Figure 2.12 Technology mediated experience matrix (Mohd et al., 2019, p.134)

In addition to the demographic characteristics of users, it is crucial to consider the type of social media application and the underlying motivations of its users. Peters et al. (2013) break social media applications into six groups that have developed in response to human need: "1) collective projects (e.g., Wikipedia), 2) blogs and microblogs (e.g., Twitter), 3) content communities (e.g., YouTube), 4) social networks (e.g., Facebook or LinkedIn), 5) massively multi-player online role-playing games, or MMORPGs (e.g., World of Warcraft), and 6) social virtual worlds (e.g., SecondLife)" (p. 288). Each type of social media has arisen to serve users with different motivations, values, and objectives. Hallikainen (2014) identified five core values perceived by people in the usage of social media platforms; these are 1) functional, 2) social, 3) emotional, 4) epistemic, and 5) conditional values. In addition, Katz, Blumler and Gurevitch (1973) argued that characteristics of individual users affect their motivations for engaging with social media as well as which types of social media applications they use. For instance, individualists are more likely to utilize social media for emotional expression than collectivists due to their motivation for "self-stimulation and self-satisfaction" (Scott, 2018, p. 644).

Table 2.9 Value categories (Hallikainen, 2014, p. 12).

Value	Definition
Functional	Perceived utility acquired In the case of social media: the capability of social media platforms to provide functionality or means to achieve one's goals
Social	Perceived utility related to associating with specific social groups In the case of social media: the social value acquired from associating with social groups using social media platforms. Maintaining one's social image through the use of social media platforms
Emotional	Perceived utility related to feelings aroused In the case of social media: emotions aroused by the use of social media platforms, such as enjoyment
Epistemic	Perceived utility related to arousing curiosity, providing novelty, or satisfying a desire for knowledge In the case of social media: the capability of social media platforms to arouse curiosity or provide novelty or knowledge
Conditional	Perceived utility related to a specific situation (e.g. seasonal value of Christmas cards) In the case of social media: value related to social media use in a certain situation, such as one's birthday

In the case of Instagram, even though founders Kevin Systrom and Mike Krieger started Instagram to serve simply as a lifestyle photo sharing application, users of the new app quickly embraced it as a personal communication platform (Shafer et al., 2018). Sheldon, Rauschnabel and Antony (2017) analyzed five aspects of motivation for Instagram usage: "1) social interaction, 2) documentation, 3) diversion, 4) self-promotion, and 5) creativity" (p. 644); they further broke each aspect into more specific actions to understand user motives in more detail. For instance, in the first aspect, social interaction, "to see what other people share," "to like my followers' photos," and "to see visual status updates of my friend" (p. 644). Given the "addiction to connectivity" (Mohd et al., 2019) of the key user group, Millennials, every aspect of their daily life has become subject for the constant capturing and sharing of "insta-worthy" photographs. In addition to the personal motivations, Instagram has increasingly taken on additional purposes including marketing, broadcasting, or educational use (Belfer et al., 2020). The article "Do It for The "Gram": Using Instagram To Educate The Millennial Learner" by Belfer et al. (2020)

stresses the characteristics of Millennial's learning style and the needs for adaptation of social media in teaching process.

2.3.3 Hashtags on Social Media

A hashtag is, from folksonomy[2], a word or unspaced phrases preceded by a pound '#' symbol that enables users to sort through and locate content pertaining to a specific topic (Sheldon et al., 2017). As this combination acts as a label for the content itself (Caleffi, 2015), each tag can be used to find related content. In addition to serving their primary purpose as "a new type of organizational objects of information" (Yang et al., 2012, p. 1), hashtags also play a significant role in building virtual communities of users (Yang et al., 2012). As the traditional definition of community, people with shared interests, concerns or any personal background can cluster and form online communities with common hashtags (Potnis & Tahamtan, 2020). This second role of hashtags is more closely tied to the motives of the founder of modern hashtagging, web designer Chris Messina. Although a form of hashtags was used on Internet relay chat (IRC) networks in the 1990s (Paige, 2014), the first attempt to index a certain piece of content as people do today was on August 23rd, 2007 through Messina's tweet, "how do you feel about using # (pound) for groups. As in #barcamp [msg]?" as seen in Figure 2.13.

As an adaption of language for computer-mediated discourses, hashtags quickly spread from Twitter to other social media applications such as Instagram, Facebook, Pinterest, Tumblr, YouTube; other types of media (Heyd & Puschmann, 2017); and even into our spoken languages (Scott, 2018). As hashtags are a significant semiotic resource, their proliferation across social media has been followed by numerous studies across

[2] "the combination of the words folk and taxonomy-indicating the collective social organization and description of information at the metadata level. … in contrast with a traditional taxonomy, a folksonomy does not follow a pre-determined organization or indexical structure, but is, instead, a socially and collectively produced alternative" (Highfield & Leaver, 2014).

various disciplines, including linguistics, media studies, sociology, political science, business, and informatics (Heyd & Puschmann, 2017). In January 2011, Instagram enabled its users to use hashtag functionality for image sharing; Instagram users started to apply hashtags to anchor their photographs with descriptive contents, emotional expression, or contextualizing information.

Figure 2.13 The first hashtag on Twitter, August 23, 2007.[3]

As it became a social convention in the digital sphere in the early 2010s, hashtagging in public space emerged as a phenomenon throughout various social media platforms and even in daily life. The spread of mobile devices and social media platforms has led to an increased convergence of *virtual cyberspace* and the *real world* (Herring, 2013; Deumert, 2014); therefore, the presence of hashtags in public space can be understood as part of "the convergence of digital and physical manifestation of the public sphere" (Heyd & Puschmann, 2017, p. 55). Along with these digital affordances, various communities in the *real world* have been formed around location-based hashtags in the digital public sphere, and online communication continues to replace face-to-face interaction.

[3] http://twitter.com/chrismessina

In terms of the taxonomy of hashtags, as noted above, a hashtag consists of the '#' symbol and one or more unspaced words; consequently, the number of words in combination for hashtags has led to the creation of different characteristics for each form of hashtag. Caleffi (2015) explored this pragmatic exploitation of the hashtag with the types of hashtag shown in Table 2.10; the first type of hashtag, # and acronym/abbreviation, is not always "semantically transparent" (p. 53), but it provides a sense of community with hashtags of recognized events, shows or institutions. The most frequent type of hashtag is a single word preceded by #. This one-word type, usually a content word, tends not to carry any semantic load, unless mixed with an adjective which express a feeling or a comment. Similar to a sequence of two or more one-word hashtags, the two-word type of hashtag offers more pragmatical uses with the combination of adjective and noun or noun adjunct and noun. In varied combinations of noun, verb, phrases or clauses, three-word hashtags serve various purposes such as making suggestions or comments, expressing feelings, and promoting with slogans. A similar tendency was revealed in the more-than-four-word type of hashtag with different levels of creativity.

Table 2.10 Taxonomy of English Hasthags (Caleffi, 2015, p. 53)

Type of Hashtag	**Example**
# + acronym / abbreviation	#ootd
# + 1 word	#manhattan
# + 2 words	#prettypark
# + 3 words	#thingsnobodysays
# + 4 words	#fromwhereistand
# + 5 or more words	#IAmElyarsBillionthGirl
# + letters and numbers	#b2bhour

Researchers have identified various motives for the use of hashtags; on Instagram, they can be seen as serving two primary purposes. First, users employ hashtags as a means of *information sharing*, for labeling or contextualizing the contents of the associated

photograph. Second, hashtags are utilized to describe users' feelings, as a method of *emotional expression*, associated with the image by tagging emotive words (Ye et al., 2018; Baranovic, 2013). The literature also identifies alternative purposes of hashtags on Instagram, such as for marketing and other monetization strategies, interpersonal use (Heyd & Puschmann, 2017), self-presentation or self-promotion (Lupinetti, 2015), surveillance, documentation, and creativity (Erz & Osadchaya, 2018). The primary hashtag categories considered in the development of categories for this study were those of Isabelle (2018), *content-related tags*, *emotiveness*, *sentences*, *isness*, *performativeness*, *fakeness*, and *insta-tags*. Among contextualized hashtags, location-specific tags such as #newyork, #bryantpark, and #madisonsquare were considered a separate type of hashtagging in order to examine the relationship between user-generated content (UGC) in urban public spaces and the image of the city. For this study, five hashtag categories developed based on the literature are as follows: 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness*, and 5) *city-relatedness*.

Content-related tags involve any subject depicted in the picture, whether directly or abstractly (Isabelle, 2019). A two-dimensional approach is widely accepted in interpreting subject indexing of an image, categorizing tags as representing either *ofness* or *aboutness*. *Ofness* refers to the assigned tags describing things or objects captured in the setting of an image, while *aboutness* describes themes or stories depicted by the image (Fattahi & Arastoopoor, 2012). The ideas were applied to categorize the sample data of users' photographs in urban public spaces for this study.

For the second category, *emotiveness*, two sets of subcategories were applied to explore sentimental qualities attached to the urban place. The first set takes eight affective qualities of place from the literature: 1) *arousing*, 2) *exciting*, 3) *pleasant*, 4) *relaxing*, 5) *sleepy*, 6) *gloomy*, 7) *unpleasant*, and 8) *distressing* (Russell & Pratt, 1980). The second

set of subcategories was adopted from recent research (Ye et al., 2018); posts were categorized using their hashtags as *positive, neutral,* or *negative,* where posts not including any sentiment tags of *emotiveness* were categorized as *neutral*.

As documentation constitutes an important motive for posting on Instagram (Sheldon & Bryant, 2016; Erz et al., 2018), the third category of *documentiveness* includes hashtags covering "all non-topical features of the photograph" (Isabelle, 2018, p. 53). *Documentiveness* relates to the shared experience depicted in the image and includes any hashtags which serve documentation purposes, such as username, date, location, type of picture (Ingwersen, 2002), or technical aspects of the photograph such as type of camera or length of exposure (Stock & Stock, 2013).

As noted by many scholars, one significant function of hashtags is for meta-communication, in which hashtags act as a new type of broadcasting device in the digital environment. For instance, Page (2012) conceived of hashtags as "a crucial currency which enables visibility" (p. 184), while Chacon (2020) found that posts with hashtags receive on average 12.6% more engagement than posts without hashtags. A positive relationship was revealed between the number of hashtags and that of followers, which highlighted the promotional opportunities afforded by the use of hashtags (Martin et al., 2016). In many ways, hashtags have proven their significance in increasing readability or accessibility of the post (Ye et al., 2017); therefore, they have not only been spread throughout individual microblogs but also integrated into all types of business marketing strategies (Scott, 2018). It covers *performative tags* (Peters & Stock, 2007), *stophashtags* (Giannoulakis & Tsapatsoulis, 2016), *time- and task-related tags* (Kipp, 2006), and *Insta-tags* (Isabelle, 2018). Hashtags such as #like4like, #tbt, #followmearound, #followmefollowyou, #instadaily, #latergram, or any other tags used to attract attention to the post were categorized as *performativeness.*

Finally, in response to the characteristics of hashtag usage in public space (Heyd & Puschmann, 2017), the category of *city-relatedness* was developed to capture the relationship between the collective image of place generated by the general public and the formation of urban identity. This category will be further discussed in the next chapter.

2.4 Urban Public Spaces on Social Media

Kaplan and Haenlein (2010) conceived of social media platforms as "a group of Internet-based applications" (p. 61) that enable people to create, store and share their experience in urban public spaces with a broad audience. The term *social media* comes from two areas of research, communication science and sociology. As a medium for communication, social media is a means for storing or delivering information. From sociology, the social (network) theory and analysis are comprised of social actors (i.e., individuals, groups or organizations) with a complex set of dyadic ties they have built for themselves (Wasserman & Faust, 1994). The social interactions are intrinsic motivators that encourage people to engage in behaviors which ultimately strengthen their place-based connections (Reis et al., 2000; Pelletier et al., 2002); they lead to enhanced attachment of people to a particular space. Thus, these bonds within and between social groups create new meanings and symbols of urban public spaces (Greider & Garkovich, 1994; Gieryn, 2000).

In order to analyze and interpret user-generated content (UGC) in urban spaces, Stokols and Montero, in "Toward an Environmental Psychology of the Internet" (2002), emphasized the importance of the fundamental processes of person-environment transactions. People's relationship with their surroundings are goal-directed; consequently, they should be understood through the lens of the user's motivation. Stokols and Montero also argued that humans strive, "1) …to establish and maintain meaningful psychological

and social connections with the material world, related in their strong emotional attachments to particular places and 2) to optimize the degree of fit between their personal and collective needs for identity, affiliation, social support, emotional and physical security, and environmental legibility" (p. 666). An individual's personal and societal needs can give insight into the relationship of an individual to an urban public place today, even on the Internet.

Stokols and Montero (2002) argued that the rapid growth of digital communication technologies poses several challenges for future studies of human-environment transactions. Several critical aspects should be considered when applying users' content from social media into research to understand people's perceptions. Especially in conducting research with data extracted from social media, the following factors should be considered during content analysis: scale of place, targeted social media, platform structure, demographic factor, and data type.

Scale of Research Site

Social media analytics is still in its early stages. As Weller (2015) stated, "not even the term social media has a universally agreed definition, and there is no standard typology of social media platforms upon which everyone agrees" (p. 281). In the business and marketing context, there are a variety of open-source social media analytics tools (Stieglitz & Dang-Xuan, 2012) designed for use in the field of study. As these tools are not always applicable for different purposes and different scales such as in urban study, it should be noted that it is necessary to tune those techniques to a particular study.

In terms of research on sense of place with data from social media, a significant portion of the literature has focused on either city or regional scale (Ciuccarelli et al., 2017; Choi et al., 2007; Sevin, 2013). There is a lack of a shared framework describing systematic approaches and methodological attempts or techniques required for exploring

sense of place for a particular public space within a city or region. The most common way is to use computer-mediated approaches to analyze the frequencies of words and extract themes of urban public space (Jenkins et al., 2016). Approaches include text mining or machine learning for content analysis, correspondence analysis, and affective analysis. For instance, a study called "Crowdsourcing a Collective Sense of Place" (Jenkins et al., 2016) analyzed and quantified data from Wikipedia and Twitter. The study aggregated references to human activities within urban spaces and provided insight into multiple scales of urban spaces ranging from city to neighborhood and street, including Times Square, Rockefeller Plaza, Penn Station, and Battery Park. Jenkins et al's study related a sense of place for various urban public spaces into six themes that were extracted from the Twitter and Wikipedia data: Recreation, Entertainment, Sports, Business, Politics and Education. These themes, however, were not necessarily representative of people's subjective perceptions, their feelings or values, about those environments.

Targeted Social Media / Platform Structure

Our society has access to a myriad of social media platforms that cover a wide range of consumer interests, each with its own technological affordances. Boyd and Ellison (2007) argue that all social media allows users to do three things: first, to build a profile that can be seen by a select group of others; second, to create a network of other users they share some connection with; and third, to view the profiles and information shared by those other users. While their key technological features are fairly consistent, there are differences between social media platforms. These differences have allowed each social media platform to manifest its own unique culture (Boyd & Ellison, 2007). Consequently, Ruths & Pfeffer (2014) argue that a number of validity problems such as platform biases, data availability biases, and data authenticity issues should be taken into account in studies using data from social media platforms. Due to the unique

characteristics and structure of each particular social media application, people's experiences and perceptions, even of the same urban public space, can be understood differently on each one. Therefore, in order to explore a comprehensive sense of place for a particular urban public space in the digital sphere, people's perceptions across the various social media outlets need to be taken into account.

Demographic Factor

As the characteristics and structure of social media applications shape the methods of presentations and types of user content, different user types are observed throughout varied social media platforms. Some sites cater to diverse audiences, while others attract people based on common language or shared racial, sexual, religious, or nationality-based identities (Boyd & Ellison, 2007). According to the Social Media Fact Sheet by Pew Research Center (2018), the usage rates of social media by certain demographic factors, such as age, gender, and educational attainment have shown considerable differences since 2006, while marginal differences are shown in terms of usage between race and income. These demographic and personal factors will influence an overall sense of place observed from a particular application; thus, user type and associated characteristics of the targeted social media outlet, the photo-sharing platform Instagram in this study, must be considered in any study using data from social media.

Data Type

Data on social media can be divided into *structured* and *unstructured* data. Structured data is comprised of profile/user demographics; spatial, temporal, and thematic data; and engagement-related data (e.g., number of likes, views, clicks, tags, etc.). Unstructured data includes user-generated visual and textual content ranging from relatively context-sparse microblogs and comments to context-rich blogs (Stieglitz, 2012). Both types of data, users' photographs and hashtags, will be utilized for this study. There

are three distinct aspects of content, regardless of the data types, are commonly considered in analyzing data from social media platforms: “1) content quality, subsuming content characteristics (e.g., interactivity, vividness), content domain (e.g., education, entertainment, information), and narrative styles; 2) content valence, subsuming emotions (e.g., anger, anxiety, joy) and tonality (e.g., positive, negative); and 3) content volume, subsuming counts and volumes” (Peters et al., 2013, p. 287).

To explore a collective subjective user perception of urban public space on social media, this study selects the most widely used photo-sharing social media platform, Instagram. With the advantages of Participant Generated Image (PGI) approach, the visual evidence of users’ on-site experience presented on Instagram is expected to provide great opportunities for understanding human-environment relationship in the current digital age. Instagram is not only known for its social networking service, but and also as information resources with a high level of credibility. As travel is known as the top interest among Instagram user groups, available contents on Instagram could impact an individual’s the cognitive and affective experience towards a particular place over before to after visiting. Millennials have a largely technology-mediated experience, which has an impact on the development of emotional state to a place. Through capturing, labeling, and sharing their experience for virtual communication, people may construct their own space in a particular place and thus form personal relationship to the environment; the technology engagement, and co-creational nature of highly mobile environment apparently change the conventional way of place experiencing (Mohd et al, 2019).

2.4.1 The Urban Public Space and the Image of the City

As public space forms the most visible feature of any town or city, and therefore often becomes symbolic of local culture (Grobelsek, 2015), urban public spaces have a considerable influence on the image of the city, shaping the urban culture and lifestyles of their communities and vice versa. For instance, the achievements of many civilizations have been measured by the public spaces they created and maintained (Grobelsek, 2015). In urban centers, public spaces, including squares, parks, waterfronts, city forests, traffic areas, etc. (Grobelsek, 2015) serve crucial roles as sites for essential public activities including leisure, commerce, and transportation (Yang et al., 2019).

Specifically, Lang and Marshall (2017) argue that urban squares, which form the research sites for this study, have traditionally acted as the centers of cities' networks of public open space, in turn helping shape the character and identity of the entire city. Because of their openness and versatility, urban squares often become social nodes and centers for city events (Zakariya et al., 2014), making them places where residents engage with the larger city and thereby shape their own experiences of the city (Harprin, 1981). In *The Image of the City*, Lynch (1960) also conceives of an urban square as a *node*, or the strategic *focus* in the recognition of a city. The node gives the city "imageability," which refers to "a high probability of evoking a strong image in any given observer" (p. 9).

According to Lang and Marshall (2017), urban squares serve a symbolic function as "the communicator of a sense that a place belongs to a group of people," and they see two key aspects to this role: "first, squares *as part of a culture or subculture* and, second, as *a mark of social status*" (p. 149). In individuals' perceptions, urban squares are often symbolized by or associated with physical features, artifacts or cultural events held there, or even historical events or groups of people. In many urban squares, the sociopolitical factors of everyday life are significant elements. In addition, squares have been used to

symbolize *national identity,* to commemorate historical events or foster pride or patriotism; *group identity,* particularly among pluralistic societies; and *self-identity.*

> "The style of squares and what they contain communicate meanings about who we are. Memorials to famous people and/or to famous victories in battles remind people of their heritage and who they are (or, rather, who they believe themselves to be)." (Lang & Marshall, 2017, p. 151)

Lang and Marshall (2017) also identify a set of basic factors that help successful squares play each of three roles: as *places*, as *links*, and as *displays*. They note that not all factors must be present, but the factors can be selectively applied for the purposes or contexts of squares. Six design factors are discussed for making squares lively as *places*: 1) getting access to a square, 2) sitting, 3) talking, 4) watching and being watched, 5) performing/self-testing, 6) eating, and 7) events/programming. These are essential elements of urban public space, yet considerable efforts have been required to examine how these factors interconnect with people's experience and perceptions of the city. Whyte (1980) conducted one of the most revolutionary urban research projects of the last century, *The Social Life of Small Urban Spaces* (1980), and its accompanying film through direct observations, interviews, and time-lapse filming in New York City. Today, user photographs shared on social media present an even more efficient way to investigate the essential factors of urban public space.

The second criterion for making squares, as *links,* was discussed based on five design standards: 1) basic requirements, 2) comfort, 3) safety and security, 4) belonging and esteem, and 5) experiential esthetics (p. 260) in relation to the *relationship to surroundings* and as *passageways.* The same five aspects of requirements were discussed as a *display* by "*in the users' eye* and *in the eyes of the cognoscenti*, or professionals" (p. 266). Collective perceptions in urban public space shared on the Internet will offer the lens of *the users' eyes* to help understand sense of place of contemporary urban public space.

As centers of urban life, squares change their presence every moment, day and night, throughout the course of a year. Lang and Marshall (2017) argue that seasonal changes in the affordances of the urban square, as minor seasonal interventions provide more diverse physical settings for human activity in different seasons, help to shape and differentiate the identity of each square. They argue that a higher "sense of a locale" (p. 42) can be achieved through the perceptions of seasonal changes in urban squares, which enrich public life in a city; the natural features, with the variety of plantings and vegetation, are indispensable elements of the seasonal changes in urban squares (Zeka, 2011). Flexible and convenient physical conditions are another crucial factor that supports various activities through every season of the year. User content with associated time information (when people posted) will serve as a resource to examine users' perceptions of seasonal variations in experience of urban squares in the digital environment.

According to Stern and Krakover (1993), a *city image* is formed on "an interrelated system of perceptual and emotional components that form a single and unified meaning" (Folgado-Renandez et al., 2015, p. 78). Kavaratzis (2004) suggests that a city image is communicated through three distinct, yet interrelated, types of communication, *primary*, *secondary*, and *tertiary*. *Primary* refers to actions taken by the city itself, *secondary* relates to formal intentional communication such as branding or marketing practices by municipal organizations, and *tertiary* communication refers to word of mouth, and on the Internet, electronic word of mouth (eWOM), of residents. As seen in Figure 2.11, tertiary communication, including eWOM through user-generated content (UGC) in public spaces, is a critical factor in the formation of the city image (Kavaratzis, 2004). The collective perceptions and interactions of people in urban spaces, along with the other attributes featured in Figure 2.11, continue to contribute, directly and indirectly, online and off, to the sense of urban spaces and the image of the city today.

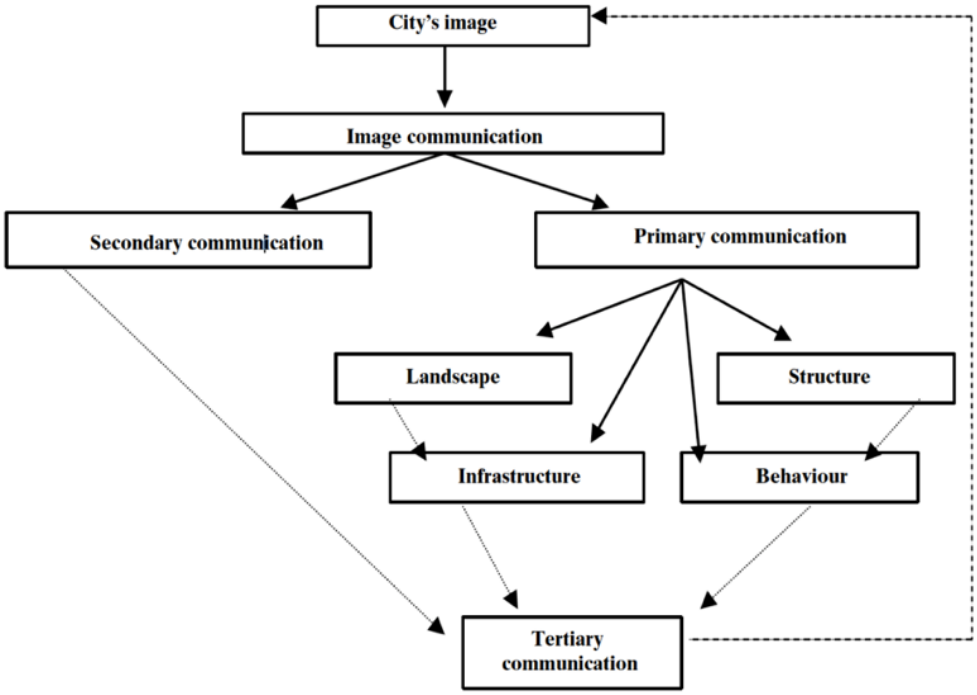

Figure 2.14 City image communication. (Kavaratzis, 2004, p. 67)

Cleave et al. (2017) also noted that due to the interconnectivity of the virtual environment, municipalities are able to interact directly with their residents and help influence word-of-mouth (WOM) place reputation. Many marketing studies have shown the link between a high level of user engagement on social media with customer loyalty (Brodie et al., 2013) and satisfaction (Challagalla et al., 2009), as well as the tendency of reputation to spread by WOM (Cheung et al., 2009). On the other hand, Oliveria (2016) points out the potential for conflict between the content generated by professionals and the rest of UGC from residents and tourists on social media channels.

The concept of *destination image* from tourism literature can provide insight in understanding sense of place in the digital environment. Destination image is defined as the sum total of all impressions, which include "mental representation of knowledge, feelings and overall perception of a particular location" (Chen & Tsai, 2007, p. 1116), formed by a combination of the destination's attributes on-site and online. This process

shares fundamental similarities with the formation of sense of place in virtual environments. The literature provides slightly different approaches; meanwhile, destination image transformation can be classified into two primary stages: *pre-visit image* and *post-visit image*. The pre-visit image is formed based on organic and induced images; *organic image* refers to mental impressions based on information gathered from the third party sources including media, education and WOM from friends or family members. The induced image originates the information from commercial sources such as magazines, brochures and marketing agents (Madden et al., 2016). Information from the Internet is also considered as the organic or induced source, a form of secondary or tertiary communication in Table 2.11 with a high level of credibility; since users directly generate and control their own content and utilization. The post-visit image for a particular space is formed after the individual has experienced the place. An individual's post-visit image—a subjective, complex, yet relatively specific and realistic image—can be captured through UGC, which in turn may influence someone else's pre-visit image. The democratic nature of digital platforms creates a new phenomenon in virtual environments and therefore in understanding perceptions of urban public spaces.

Table 2.11 Interrelationship of various definitions of the destination image (Madden et al., 2016, p. 252)

	Phelps (1986)	**Gunn (1988)**	**Gartner (1993)**	**Tocquer & Zins (2004)**
Pre-Visit Image	Secondary image	Organic image	Organic image	Unclear image
		Induced image	Induced image (overt inducement by destination marketing)	Clear image
			Induced image (covert inducement by word of mouth)	Improved image
Post-Visit Image	Primary image	Primary image	Complex image	Final image

2.5 Summary

The concept of sense of place encompasses meanings, beliefs, symbols, values, and feelings of individuals or groups that are created through continued interactions with their immediate environment. As parts of individuals' digital identity, the user-generated content (UGC) shared from urban public spaces available across the varied social media platforms offers an innovated opportunity to understanding a collective sense of place and the role of contemporary urban public space in the image of the city.

Previous studies on sense of place with social media data mostly focused on textual data, including microblogs, comments or hashtags, and extracted themes using frequency-based approaches. In spite of the advantages of the Participant Generated Image approach in understanding the relationship between people and places, there is a paucity of research with user's visual materials from photo-sharing social media platforms. Therefore, this study utilizes user-generated content from Instagram in order to fill the gap for comprehensive understanding the landscape of sense of place across varied type of social media. In addition, the associated hashtags to user-generated photographs should not be interpreted as textual data at face value. As the results of the interactive experience of people in urban public space, a set of hashtags of each photograph should be analyzed in relation to the development of one's relationship to a place. This may reflect the formation of cognitive and affective relationships such as one's distinct features over the course of time or the creation of emotional bonds, meanings, values towards a particular place. As a tertiary communication on the Internet, the UGC in urban public space can influence not only on one's perception to urban public space, but also contribute to the image of the city with a high level of credibility.

CHAPTER THREE: METHODOLOGY

Introduction

The primary objective of this study, is to identifies a collective sense of place in contemporary urban public spaces and their characteristics as presented through the photo-sharing social media application Instagram. To fill the gap in the existing literature, this study focus on a visual social media outlet rather than text-based platform such as Twitter. Taking a collection of user-generated photographs and associated hashtags as the sample for this study, visual and textual content analysis methods were utilized to answer the research questions, which explore the feasibility of user-generated content (UGC) on Instagram for gaining insight on the essential components of sense of place. Applying content analysis to images involves "break[ing] a picture into a number of attributes guided by what is depicted on a photo and tak[ing] these representations at face value" (Stepchenkova & Zhan, 2013, p.592); in the case of this study, analysis was performed together with associated hashtags. The relationship between the imagery and associated hashtags of the UGC is considered an important factor in interpreting collective subjective perceptions from urban public space.

This chapter is organized into six sections. First, the research design and rationale for content analysis are addressed. The second section revisits the research questions and objectives for each question. The third section describes the brief history and current context of the three research sites: Bryant Park, Madison Square Park, and Union Square in New York City. The fourth section discusses the sampling method as well as the data collection and preparation methods. The fifth section describes the image and hashtag categories used in this study. The sixth section includes a discussion of the coding procedure, pretest, and quantitative phase of the research.

3.1 Research Design

This study employs a quantitative content analysis in order to explore a collective sense of place in urban public space through user-generated content on Instagram. The users' photographic content and associated hashtags will offer perceptions from the informants' perspective (Urry, 1995), providing richer and more detailed information than the researcher's perspective. Utilizing the user-generated content helps reduce bias that may arise from the prejudices of the researcher (Collier & Collier, 1987). This study will complement the existing body of literature that uses frequency-based approaches with data from text-based platforms (Jenkins et al., 2016) to provide a more comprehensive understanding of sense of place in the digital environment. Also, understanding the relationships of user hashtags to their photographs will give deep insight into how people document and consume their experiences of urban public space as they construct their online identity. In addition, this study will provide an overall shape of user perceptions on a photo-sharing social media application by using descriptive statistics to categorize their photographs and hashtags (H. Lee & Y. Son, 2018; H. Kim et al., 2017). Given the importance of hashtags in the visibility (Page, 2012) and interconnectivity of content on the Internet, this study will also identity the relationships between user hashtags and types of their photographs by conducting a series of chi-square tests; it will reveal the distinct patterns of hashtag behavior used in urban public spaces on Instagram.

To fulfill the research objectives of this study, the benefits of both human efforts and the latest technological methods are employed in the process of content analysis. Content analysis is a well-established, replicable set of techniques for making inferences from visual and textual information about sources or content of information (Macnamara, 2005). It enables researchers to systematically compress large volumes of data into a few content categories (Marine-Roig, 2017). The large scale of user-generated content (UGC)

and significant technical advances in data collection and analysis have introduced both challenges and benefits to content analysis. In order to preserve the benefits of the traditional approach, many researchers have suggested using a hybrid approach of computer power and manual methods (Lewis et al., 2013). In order to overcome the possibility of ignorance in "principles of representative sampling and of the deductive process of scientific investigation (p. 204)," Paul (2017) emphasized the importance of human coding to the process of analyzing so-called big data. Taking advantage of the massive quantity of data from urban public spaces accessible on social media, this study collected a list of 149,863 photos published on Instagram and associated hashtags via geographic metadata with three urban public spaces, Bryant Park, Madison Square Park, and Union Square in New York City, over a one-year period from October 2018 to September 2019. A total of 1,200 posts, 400 for each public square, were selected by systematic random sampling from the list using 4K Stogram software. Based on the suggestions discussed above, this study begins with a qualitative phase, employing manual categorization techniques to identify the concepts in visual and textual data of the UGC. The second phase applied a statistical analysis method, a set of descriptive analytics, and chi-square tests to answer the research questions for this study. A chi-square test is used to determine the relationships between categorical variables of each user photograph and its hashtags. The next section will discuss in detail the research questions and the procedure to answer each question.

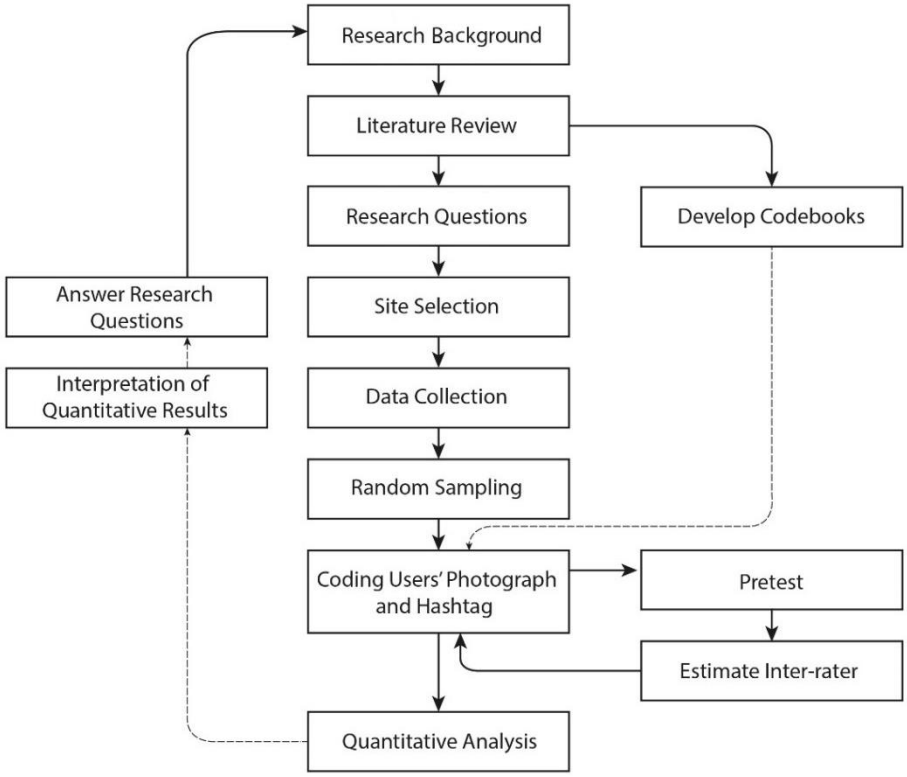

Figure 3.1 Research flow chart.

3.2 Research Questions

As discussed in the introduction, two research questions and three sub-questions were identified to address the objectives of this research. Each of the research questions is discussed in detail below in terms of how it contributed to the study.

3.2.1 Research question 1 (RQ1)

Sense of place is an ever-changing concept tangled with perception of people, the society and the culture it is in. Therefore, various approaches to understand the sense of place have been done in accordance with each its own research area. The era of social media, so called Web 2.0 era, has provided a new opportunity to examine sense of place that was not available before. User-generated textual or imagery content provide information shared through various social media platforms. Perceptions achieved through the said content can vary among types of the platforms being used as the multitudes of the social media platforms cover a wide range of the user interests. Which brings the question of how people describe urban public spaces with image content and hashtags on Instagram, a photo-sharing social media platform.

The first research question examines the overall shape of presented subjective experience in urban public space through user photographs and hashtags. In addition, this question identifies how people hashtag photographs they take in urban public spaces by analyzing the association between image category and hashtag category. In order to provide insights into how people perceive, present, and evaluate their experiences at urban public spaces, the Instagram photographs and associated hashtags are employed in a participant-generated image (PGI) approach. Stedman and his colleagues (2014) wrote that many studies "... still have rarely offered research participants the opportunity to take their own pictures to communicate their experiences and symbols (p. 114)." In response to these challenges, this study uses geo-referenced user photos available on Instagram, thus offering an innovative way to elicit a sense of place empowered by the experiences and self-reflections of the community. In this study, user-generated hashtags act as an alternative to the interview/survey typically used in photo-based research methods for "moving toward a collaborative bond where the subjects direct the photo taking" (p. 113). Given their descriptive and emotional meanings, hashtags offer a chance to explore the cognitive and affective bonds between people and the urban public spaces they depict in their photographs. For this analysis, chi-square tests were conducted to analyze the associations between photo categories and hashtag categories.

3.2.1.1 Sub-question 1-1 (RQ1-1)

A set of feelings through the interactions between settings and personal and psychological aspects is an important factor in understanding the sense of place, and user-generated data including hashtags on social media has or can have a critical role in providing such information. What emotional value is contained in hashtags associated with user photographs of urban public spaces?

This question investigates how people present the affective qualities of place and emotions that they experience in urban public spaces by analyzing "the collective emotion

indexing" (Schmidt & Stock, 2009) associated with their photographs of the three research sites. This question also explores the patterns of hashtag usage for emotional expression captured in the geotagged Instagram posts, and checks the feasibility of user hashtags in the context of their images as a resource for identifying emotional values in urban public space. Understanding the nature of emotional hashtags can provide insights into subjective place experience, emotional ties, and meanings given by individual users to urban public spaces. This question is important in understanding the characteristics of person-place bonds described through UGC on the photo-sharing application Instagram.

To determine the feasibility of emotional hashtags as a resource for capturing users' emotional expression from urban public spaces, two separate categories were utilized: *affective qualities of places*, with eight subcategories, and *sentiment*, with three levels. In addition to the descriptive analysis, two separate analyses were conducted to understand the relationships between user photographs and the two sets of categorized hashtags. First, the association was tested between the image categories and eight affective qualities of places: *arousing, exciting, pleasant, relaxing, sleepy, gloomy, unpleasant*, and *distressing* (Russell & Pratt, 1980). Next, the association between the image categories and three levels of sentiment adopted from the literature, *positive, neutral, and negative* (Ye et al., 2018), was tested. For this analysis, chi-square tests were conducted to analyze the association between each photo category and hashtags belonging to the *emotiveness* category.

3.2.1.2 Sub-question 1-2 (RQ1-2)

Historically, people's perceptions of the urban public space have been deeply related with the urban identity of the city. People's perception have added user-generated content, as the society has opened itself to the online platforms. These user-generated content are interconnected with the urban public spaces and also the city itself through the users' hashtags. How does user-generated content of urban public spaces on social media contribute to the image of the city?

This question seeks to identify the contribution of contemporary urban public spaces to the formation of urban identity in the digital environment by analyzing the *city-relatedness* of hashtags. Urban public spaces, particularly squares, have a long tradition of shaping the images of cities. This question seeks to identify the influence of contemporary urban public space on the creation of the image of the city on social media. To answer this question, the *city-relatedness* of hashtags to user photographs was investigated; three subcategories of *city-relatedness* were developed, namely 1) *city name*, 2) *other place*, and 3) *compound word*. By analyzing the relationships between photographs and the *city-relatedness* of their hashtags, this study can provide statistical evidence to support concepts found in the literature.

3.2.2 Research question 2 (RQ2)

Place identity is the fundamental factor of sense of place that allows a place to differentiate itself from other public places. Does the user content of shared images and hashtags on Instagram reflect the distinctiveness of urban public spaces, and if so, how?

In addition to identifying a collective perception of place from three urban public spaces, this research question asks how user photographs communicate the distinctiveness of physical and social attributes, one of the essential principles of place (Twigger-Ross & Uzzell, 2014, Gustafson, 2001), for each of the research sites. A comparison of the three squares, Bryant Park, Madison Square Park, and Union Square in New York City, shed light on the core identity of each square and which factors differentiate it from the other two research sites. This comparison also led to an understanding of the common qualities people perceived, memorized, and presented in relation to the urban squares. The findings of this analysis can be beneficial for good decision-making in planning urban public squares that suit the needs and desires of their residents and visitors.

3.2.2.1 Sub-question 2-1 (RQ2-1)

The concept of a place changes as it interacts with time. The perceptions of seasonal changes are of central aspect in determining the sense of place. How does the user contents of shared images and hashtags on Instagram reflect seasonal changes in urban public spaces?

Seasonal strategy is one of the 10 principles for successful squares (PPS, 2005). As Lang and Marshall (2017) highlighted, the visibility of seasonal changes in urban public spaces leads to a more developed "sense of a locale" (p.42), which may contribute to the formation of sense of place for a particular square. To explore the potential of user-generated content (UGC) as resource for examining seasonal changes in people's perceptions and experiences in urban public space, this question examines the representative attributes of three urban squares as characterized by users in different months and seasons. The findings from analysis of this question are instrumental to understanding how people interact with the physical environment and activities offered by urban squares over different seasons. They can also reveal the differences in UGC across two time intervals: seasons versus months. By showing temporal changes in collective sense of place in a virtual environment, this research can fill the gap in sense of place scholarship and support stakeholders in the place-making process as they develop seasonal strategy.

3.3 Study Sites

This study selects Bryant Park, Madison Square Park, and Union Square in mid-Manhattan, New York City (NYC). These three public spaces are the most well-known urban squares in NYC. The selection criteria were 1) whether the public space has been featured by NYC Parks in the "List of New York City Parks" in Manhattan (NYC Parks, 2018) and 2) whether the public space was well enough represented on Instagram, with at least 30,000 posts over the one-year period of data collection for this study. In order to

select public spaces with similar urban context, land use, and demographic features, including race and population, two maps were utilized: “Mapping Segregation” by The New York Times (2019), which displays spatial separation of the races and population density for a particular region or city, and New York City’s Zoning & Land Use Map (ZoLa, 2019). The sites for this study, Bryant Park, Madison Square Park, and Union Square, fall into the same area typology of *Square, Civic* in the Gehl Institute’s (2017) Public Life Data Protocol, as displayed in Table 3.1, and present homogeneity in racial distribution of residents in the neighborhood and surroundings of commercial district, as seen in Figures 3.2 and 3.3.

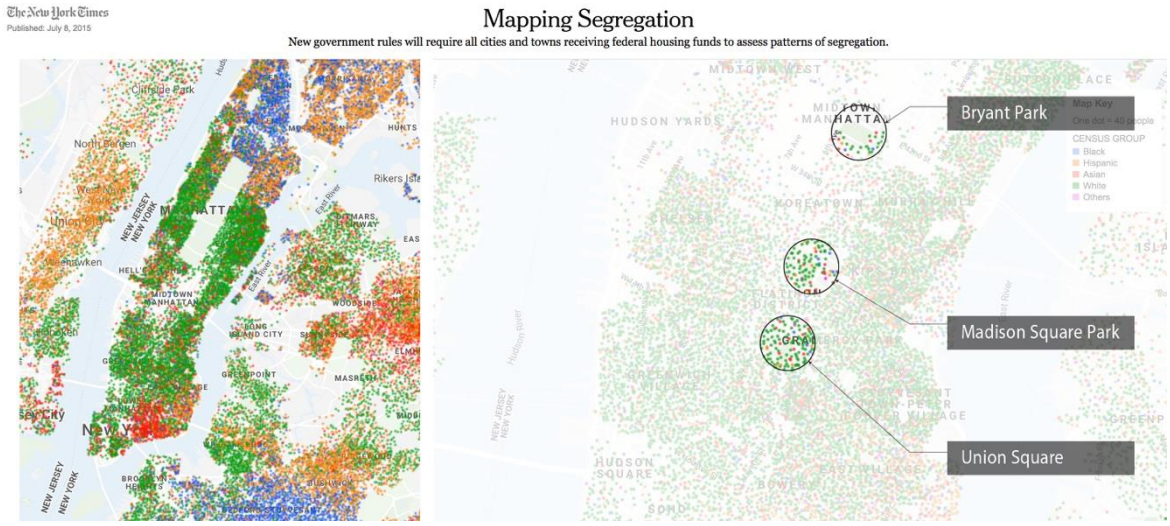

Figure 3.2 Mapping segregation in Manhattan, NYC (The New York Times, 2019).

Table 3.1 Subcategories for the field: “AREA_TYPOLOGY” (Modified by the author from Gehl Institute, 2017)

Category	**Park**	**Square**	**Station**	**Street**	**Community**	**Water**
Subcategory	Pocket	Pocket	Local	Block	Cemetery	Beach
	Local	Local	Regional	Parklet	Recreation	Riverfront
	Civic	Commercial	National	Alley	Playground	Lakefront
	Commons	Civic	International		Schoolyard	Harbor
		Temporary			Garden	Pier

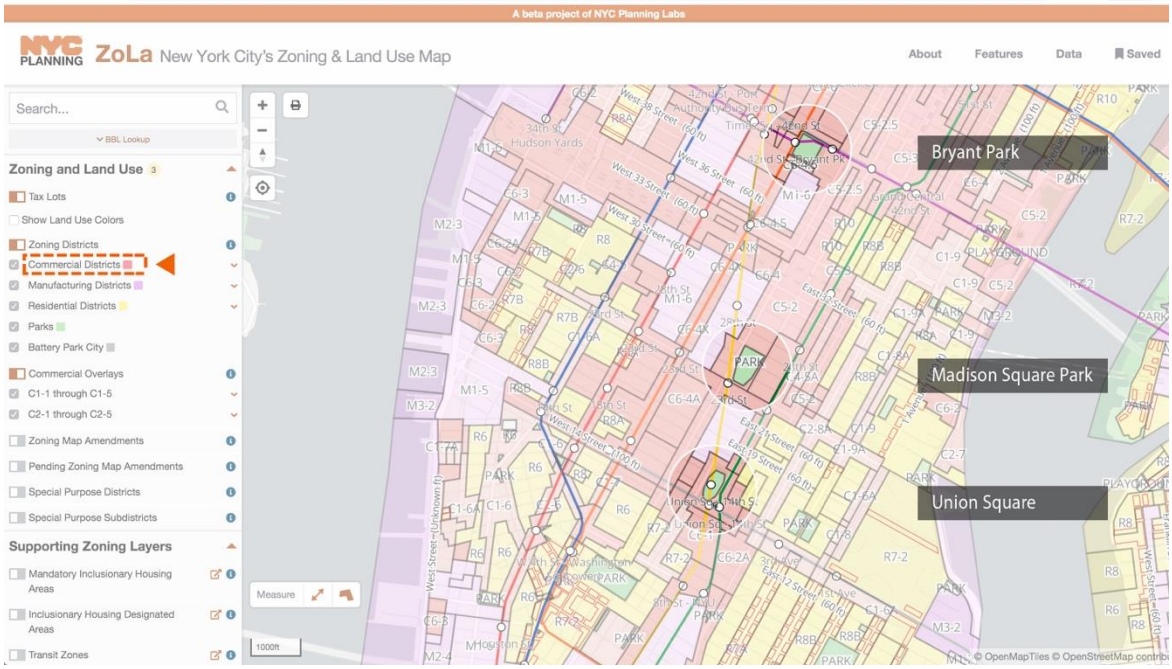

Figure 3.3 Mapping land use in Manhattan, NYC (ZoLa, 2019).

3.3.1 Bryant Park

Bryant Park, bounded by 40th and 42nd Streets, Avenue of the Americas, and the New York Public Library (NYPL), is an iconic urban square in midtown Manhattan, New York City (Madden, 2010). It is located at the center of a business and educational district, one block from Times Square, and serves as an outdoor behavior setting for its visitors, which includes office workers, students, and tourists (Francis, 2019). Bryant Park is recognized as one of the most successful public space renewal projects for its successful transformation from "Needle Park," a notorious hub of drug dealers and homeless people in the 1970s, to the beloved year-round town square of Manhattan (Ruggiero, 2014). Since its redesign in 1988 by landscape architects Hanna/Olin Ltd., it has become known as a prime example of place-making principles by the Project for Public Spaces (PPS). However, the park has also become the center of controversy, as many claim that it is built upon "surveillance, order, and the bolstering of corporate capitalism" (Madden, 2010, p. 188) under the name of urban *public* space.

Although Bryant Park falls under the jurisdiction of the New York City Department of Parks & Recreation, like many parks in Manhattan, it is managed by a private non-profit organization, in this case Bryant Park Corporation (BPC). BPC was founded in 1980 by Daniel A. Biederman and Andrew Heiskell as the Bryant Park Restoration Corporation (Bryant Park, 2020), and was initially supported by the Rockefeller Brothers Fund. On its website, BPC describes its strong belief that "a crowded park is a successful one, and that a full slate of events is essential in drawing people to the park, … the revenue paid by sponsors of events is necessary to keep the park well-maintained" (Bryant Park, 2020). This has led to the application of private management backed by private funding from surrounding property within the Business Improvement District (BID), fees from concessionaires, and revenues generated from events held at Bryant Park (Madden, 2010).

Even before its renovation and reopening in 1992, Bryant Park underwent many changes in its physical appearance. The area that is now the park was a potter's field from 1823 until 1840. In 1847, the former potter's field was designated as Reservoir Square after the construction of the Croton Distributing Reservoir on the east side of the park from 1849 to 1853. Then, between 1853 and 1854, the park was converted to the site of a world's fair exhibition, the Crystal Palace (Madden, 2010), and the city's then-tallest building, the 315-foot Latting Observatory, was built at the same time (Ruggiero, 2014). In 1884, the park was renamed after William Cullen Bryant, *New York Evening Post* editor, while the reservoir was filled and replaced by the New York Public Library (NYPL) between 1897 and 1911 (Bryant Park Corporation, 2020). The park was closed for four years during the construction of a subway tunnel and was reopened in 1923. In 1934, work began on a European symmetrical redesign commissioned by Robert Moses, head of the New York City Parks Department (Francis, 2001). However, the park was

visually separated from the street and received little attention from pleasure seekers (Francis, 2001).

Table 3.2 Bryant Park 1990s reconstruction details (Francis, 2019, p. 22)

Project Name	**Bryant Park, New York City**
Location	Avenue of the Americas between 41st and 42nd Streets, behind the New York Public Library, Manhattan
Date Designed/Planned	Original design completed in 1934; redesigned early 1990s
Construction Completed	Built in phases from 1991 to 1995
Construction Cost	Park rehabilitation = $5.9 million
Size	4.6 acres
Landscape Architect(s)	Hanna/Olin, Landscape Architects
Client/Developer	New York City Parks Department and Bryant Park Restoration Corporation (BPRC)
Consultants/Architects	Hardy Holzman Pfeiffer, New York City
Managed By	New York City Parks Department and Bryant Park Restoration Corporation (BPRC)

Following a detailed behavioral analysis in 1976 by Anita Nager and Wally Wentworth that identified core physical problems of Bryant Park, the sociologist William Whyte was invited to create a formula for redesign (Francis, 2001). In 1979, he made a number of specific recommendations from observations at the park:

> "1) [R]emove the iron fences, 2) remove the shrubbery, 3) cut openings in the balustrades for easier pedestrian circulation in and out of the park, 4) improve visual access up the steps on the Avenue of the Americas , 5) provide a third set of steps midway between the existing stairs and 42nd Street, 6) provide ramps for the handicapped, 7) open up access to the terrace at the back of the library with new steps, 8) restore the fountain, and 9) rehabilitate Carrere and Hastings' historic restroom structures." (Francis, 2001, p. 24)

Based on this set of recommendations, landscape architect Laurie Olin was hired to redesign Bryant Park in the 1990s with the main goal being "to fill Bryant Park with activity, to attract to the park as many legitimate users as possible" (BPRC, 1981). After 4 years of renovation, the square became a place of retreat, offering new elements such as movable seating, food courts, and musical events in the center of Manhattan. Currently,

four categories of year-round programs are offered: 1) *winter village*, 2) *kids*, 3) *classes + activities*, and 4) *arts + culture*.

Table 3.3 Information from Bryant Park Corporation (Bryant Park Corporation, 2019)

Location	Fifth and Sixth Avenues and 40th and 42nd Streets in Manhattan, NYC	Area	9.603 acres
Organization info	Bryant Park Corporation (BPC)	"[A] not-for-profit, private management company founded in 1980 to renovate and operate Bryant Park in New York City" (BPC, 2019).	
Mission Statement	"Bryant Park Corporation was founded in 1980 with a charge to reclaim Bryant Park for the people of New York City. Since then, the talent, dedication and execution of the BPC board and staff has transformed the park into the greatest public space in the world. The ongoing mission of BPC is: to create a rich and dynamic visual, cultural and intellectual outdoor experience for New Yorkers and visitors alike; to enhance the real estate values of its neighbors by continuously improving the park; to burnish the park's status as a prime NYC tourist destination by presenting a meticulously maintained venue for free entertainment events; and to help prevent crime and disorder in the park by attracting thousands of patrons, at all hours, thus fostering a safe environment" (BPC, 2019).		

3.3.2 Madison Square Park

Madison Square Park comprises 6.2 acres and is located in the midtown area of Manhattan, bordered by 23rd Street to the south, 26th Street to the north, 5th Avenue and Broadway to the west, and Madison Avenue to the east (NYC Parks, 2020). The park is surrounded by prime residential, commercial and business districts, including the Flatiron District to the south with the Flatiron Building, one of the city's most iconic structures, at the southeastern end of the square. Other neighboring districts include Rose Hill on the northeastern side, Nomad on the north and Chelsea on the west. Madison Square Park is currently managed by Madison Square Park Conservancy (MSPC), a nonprofit organization licensed by the New York City Department of Parks and Recreation. The organization offers various activities such as art installations, a dog run, pop-up food courts and outdoor music events for everyone (New York Times, 2018).

Madison Square Park has been repurposed throughout the layered history of the site and its surrounding districts. Similarly to many parks in Manhattan, the site was

utilized as a potter's field starting in 1794. Then the land was converted for military use, including as the United States Army Arsenal in 1806. The site is also known as the birthplace of baseball, as amateur baseball teams began to play at the park in 1842. Madison Square Park officially opened to the public on May 10, 1847 (MSPC, 2020). Even though the park was called a public park at the time, it continued to be used mainly for grand celebrations, such as commemorating historical events or anniversaries (NYC Parks, 2020). In 1870, the newly formed Department of Public Parks of New York City commissioned William Grant and Ignatz Pilat to redesign Madison Square Park (MSPC, 2020). In the neighborhood's so-called "golden age" from 1870 to 1910, the classiest hotels and most fashionable restaurants in New York City were centered in the neighborhood. Soon after, the area converted to a center for clothing and toy manufacturers (New York Times, 2018).

In 1997, after several decades of deterioration, the city launched the Campaign for the New Madison Square Park, led by MSPC. The entire park was renovated in order to bring revitalization to the neighborhood (New York Times, 2018). This initiative included physical renovation; installing new sculptures, a fountain, gateways, pathways, lighting, and more (MSPC, 2020); coordinating year-round programs such as a "tree succession plan[4]," art exhibitions, and concerts; and adding a hot-dog stand from restaurateur Danny Meyer in 2000, which would later become Shake Shack (New York Times, 2018). Currently, five series of year-round programs are featured by MSPC, 1) *Mad. Sq. Art*, 2) *Mad. Sq. Kids*, 3) *Mad. Food*, 4) *Mad. Sq. Hort*, and 5) *Mad. Sq. Dogs*. MSPC has made a special effort to offer various foods to its visitors, such as by collaborating with restaurants located in surrounding neighborhoods; as noted by Keats Myer, the executive

[4] Includes planting species native to Manhattan when Henry Hudson set foot on the island (New York Times, 2018).

director of the Madison Square Park Conservancy, “food has been integral to making Madison Square Park” (New York Times, 2018).

Table 3.4 Information from Madison Square Park Conservancy. (MSPC, 2019)

Location	Fifth Avenue and Broadway at 23rd and 26th Streets in Manhattan, NYC		Area	6.2 acres
Organization info	Madison Square Park Conservancy	“the not-for-profit organization licensed by the New York City Department of Parks and Recreation to manage Madison Square Park” (MSPC, 2019).		
On the first page of the official website	“Our mission is to protect, nurture, and enhance Madison Square Park, a dynamic seven-acre public green space, creating an environment that fosters moments of inspiration. As stewards, we strive to engage the community through our beautiful gardens, inviting amenities, and world-class programming. We believe that in an urban setting everyone deserves access to a park that allows for recreation, respite, and reflection” (MSPC, 2019).			

3.3.3 Union Square

Like the other two sites, Union Square began as a potter’s field. It later became the site of the historic intersection of Bloomingdale Road and Bowery Road and was designated as “Union Place” by the Commissioner’s Plan in 1807 (NYC Parks, 2020). As the name derived from the “union” of the two thoroughfares of Manhattan, which are called Broadway and Fourth Avenue today, it has acted as a traffic hub, also emerging as a center for entertainment, commerce, and political activism. Union Square was designated a National Historic Landmark in 1997 (NYPAP, 2020). The square is bounded by 14th Street on the south, 17th Street on the north, and Union Square West and Union Square East, and sees heavy traffic. The 14th Street – Union Square Subway station complex is also located underneath the square and is served by the 4, 5, 6, L, N, Q, R, and W trains (Fandom, 2020). Union Square is currently managed by Union Square Partnership (USP), a community-based nonprofit organization which was formed in 1976 as the 14th Street-Union Square Local Development Corporation (LDC) by a collaborative effort of government, business, and residents of surrounding districts (Walsh, 2006).

For twenty years following its opening to the public on July 19, 1839, Union Square served as an exclusive place for the fashionable residents who lived in surrounding areas (Walsh, 2006) with an enclosing iron fence and a large central fountain (NYC Parks, 2020). Then the square became a center of high class living, luxury commercial businesses, theaters and music halls such as Steinway Hall, which opened on 14th Street in 1866 (NYPAP, 2020). Union Square also served as a central location for labor protests, political rallies, parades and public meetings (NYC Park, 2020), beginning with America's first Labor Day parade on September 5th, 1882. Frederick Law Olmsted and Calvert Vaux redesigned the square in 1872 (NYPAP, 2020). In 1928-29, the site was entirely demolished and redesigned for the construction of the subway line; however, the square then began to decline and act as a haven for illegal activity such as drug use. This was mainly due to the disinvestment and relocation of many businesses to upper Manhattan, but the park also suffered from physical design issues, such as an interior that was invisible to pedestrians (Walsh, 2006). The abandonment of the entire area including Union Square led to rising crime, vandalism, deterioration, and the presence of drug dealers (NYC Parks, 2020).

In order to revitalize the Union Square area, New York City designated the area as the city's first Business Improvement District (BID) in 1984; together, the BID and the LDC led an effort to redesign and rezone the square to attract people and businesses (Walsh, 2006). Phase one of the renovation involved the southern end part of the square, providing new open entryways, removing hiding spots, and creating a central lawn for big gatherings. In phase two, the colonnaded pavilion, the north plaza, and additional gathering spaces were enhanced based on the new zoning system to catalyze private investment and, in turn, attract more people, institutions and business to the neighborhood (Walsh, 2006). In an effort to rejuvenate the Union Square area, various events were

implemented to draw more people, starting with the first Earth Day festival on April 22, 1970 and Greenmarket, the city's largest farmers' market, in 1976 (NYPAP, 2020). Currently, USP holds five types programs, 1) *Summer in the Square*, 2) *Harvest in the Square*, 3) *Square Sweatfest*, and 4) *USQ Holiday* (USP, 2020).

In September 2018, USP began to set a collaborative Neighborhood Visioning + Planning initiative for the future of the square and the 14th Street community, which was led by Marvel Architects. The project, with a main goal of "seeking balance for the Union Square–14th Street neighborhood" (Community Forum, 2019), features five detailed targets: "1) improving the core of the district while improving its connections east, west, north, and south, 2) creating more green spaces and places for respite and community interaction along the streets, 3) balancing space, mobility and livability in high traffic areas while reinforcing economic vitality, 4) smoothing utilization of the district's public spaces over different days, weeks, and seasons, and 5) balancing vitality across overcrowded and underused public spaces in the district and the park" (Community Forum, 2019).

Table 3.5 Information from Union Square Partnership (USP, 2019).

Location	Union Square East (Fourth Avenue/Park Avenue South) to Union Square West between 14th and 17th Streets in Manhattan, NYC	Area	9 acres
Organization info	Union Square Partnership (USP)	"[A] community-based non-profit organization working to ensure the best possible neighborhood for its residents, businesses and visitors" (USP, 2019).	
Mission Statement (www.unionsquarenyc.org)	"USP's programs include sanitation, public safety, economic development and marketing services, and we invest in the beautification and maintenance of Union Square Park, the district's crown jewel. As the leading advocate for the Union Square–14th Street community, we work to enhance the neighborhood's quality-of-life by creating a cleaner, safer and more enjoyable environment. We love this neighborhood and will continue to work hard to make sure that Union Square remains a phenomenal place to live, work and visit" (USP, 2019).		

3.4 Sampling Population and Data Collection

This study utilizes the software 4K Stogram to collect a list of Instagram posts published at three New York City urban public spaces, Bryant Park, Madison Square Park, and Union Square, between October 2018 and September 2019. As shown in Figure 3.4, there are three ways to search posts on Instagram: by username, by hashtag, and by location. 4K Stogram is an application that helps download photos and vide-oclips from Instagram, and has been utilized in several research projects in recent literature (Acuti et al., 2018; Lee & Son, 2018; Lee et al., 2019). For each urban public space, the software gathered a set of URLs that reference visual content publicly available on Instagram. In total, 149,863 posts were collected from three urban squares, 84,405 posts from Bryant Park, 31,121 posts from Madison Square Park, and 34,337 posts from Union Square, respectively. For this study, a total of 1,200 posts were selected by systematic random sampling, 400 for each urban public space.

3.4.1 Data Preparation and Cleaning Procedure

To fulfill the research objectives, each post in the sample population should consist of a photograph and at least one associated hashtag. In cases where the post included more than one photo, the first image of the post served as the initial sample for the set of 1,200 posts and the subsequent coding process. Any Instagram posts featuring a videoclip as the first page were excluded from the sample population. Commodification has been observed as an important tendency in the use of hashtags in public space (Heyd & Puschmann, 2017). However, any user types implementing the social media for commercial purposes were excluded so as to maintain a focus on experiences of everyday life. Excluded user types comprised city marketing agencies; travel magazines; travel influencers; and local business profiles, particularly commercial photographers and local restaurants. Finally, only posts with hashtags written in English were considered for this research. After

establishing the criteria for data preparation, the researcher captured 1,200 screenshots using the associated URLs from the list provided the software.

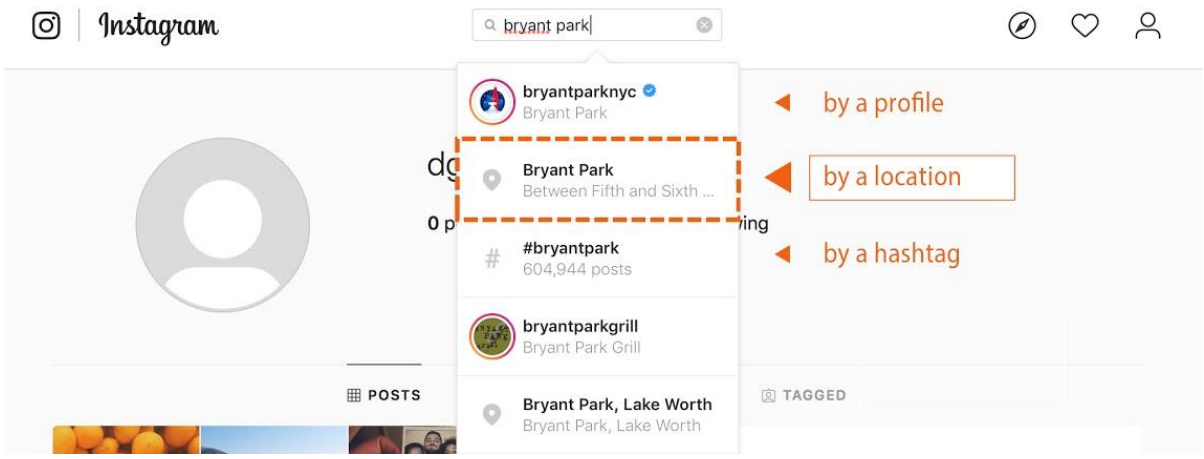

Figure 3.4 Search window for location data on Instagram (November 2019).

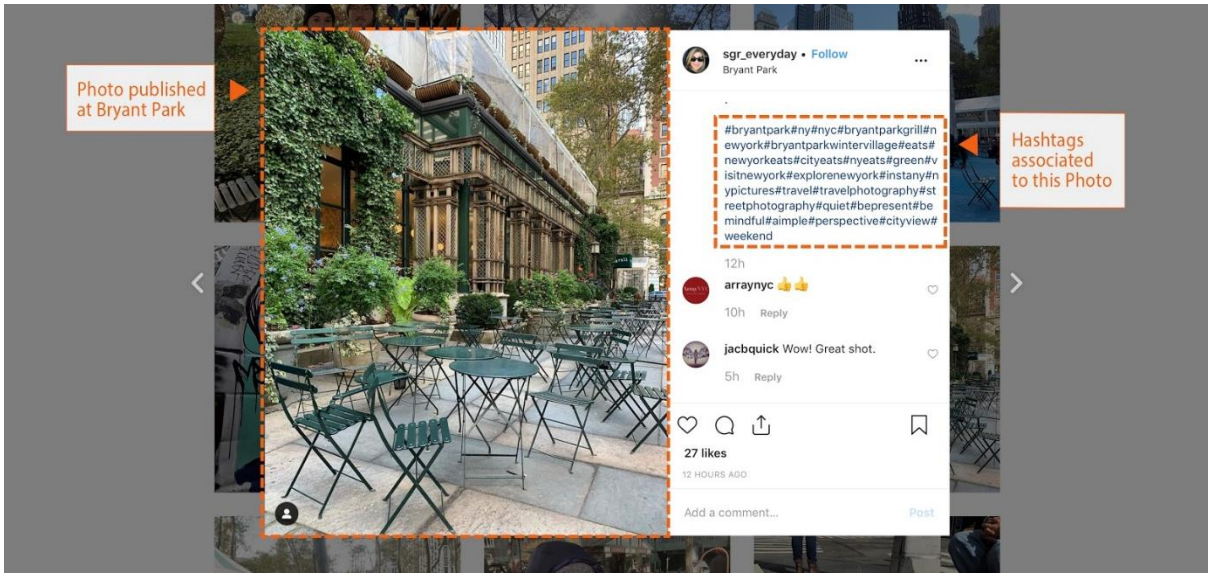

Figure 3.5 A screenshot of a photograph and hashtags on an Instagram post (November 2019).

3.5 Coding Procedures for Data Categorization

As discussed in the previous section, the coding process involved the assignment of each photograph and its associated hashtags to categories according to the coding rules adopted from the literature (Isabelle, 2018). To categorize two types of qualitative data, two codebooks were developed based on the existing studies (Russell & Pratt, 1980; Steele, 1981; Choi et al., 2006; Amsden et al., 2011; Sevin, 2013; Hu et al., 2014; Isabelle,

2018; Sheldon & Bryant, 2016; Erz et al., 2018) prior to categorizing data.[5] A total of 1,200 screenshots of Instagram posts geotagged to Bryant Park, Madison Square Park, and Union Square Park were individually categorized by the two raters in November 2019, based on the coding procedures determined through the pretest.

3.5.1 Codebook for Image Categorization

As discussed in Chapter 2, photographs from the sample were divided into three main categories based on the literature: 1) *physical setting*, 2) *activity*, and 3) *portrait*. The first two categories of *physical setting* and *activity* were developed based on the core dimensions of place (Steele, 1981; Relph, 1986; Canter, 1977). Because the dominant type of user-generated content(UGC) shared on online photo-sharing communities like Instagram are portraits of people (Bakhshi et al., 2014), many researchers have applied categories such as *selfie*, *person* (Stvilia & Jörgensen, 2009), and *friends* (Hu et al., 2014) to their coding schemes. Borrowing from the concepts of *extended self* and *environmental identity*, photos of people taken in urban public spaces can offer new insights into how people's self-identity influences how they consume a place. Therefore, the third category of *portrait* was added as one of the main photo categories for this study.

Physical setting and *activity* have been the subjects of a wide range of studies with different sub-topics to fulfill various research purposes and scopes of study in literature. In this research, the category *physical setting* consists of the following seven subcategories, identified by previous studies (Steele, 1981; Amsden et al., 2011; Sevin, 2013): 1) *weather*, 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surroundings*, and 7) *bird's-eye view*. The second category, *activity*, encompasses 1) *events & cultural activities*, 2) *sports*

[5] Using a priori coding or deductive form of analysis is one method of developing codes, while inductive or open coding refers to building the codes during the analysis (Miles & Huberman, 2020).

& recreational activities, 3) *foods*, 4) *local businesses*, 5) *local services*, and 6) *pets* (Choi, et at., 2006; Sevin, 2013). The third category of *portrait* consists of two subcategories, 1) *individual* and 2) *group*.

Table 3.6 Codebook for image categorization (Adapted from Steele, 1981; Choi et al., 2006; Amsden et al., 2011; Sevin, 2013; Hu et al., 2014)

	Subcategory	**Explanation**	**Exemplary Photos (captured from @unionsquareny)**
Physical Setting	Weather	Information on the weather	
	Arts	"Various forms of arts" (Sevin, 2013, p. 231)	
	Architecture	Recognized architecture around urban public space	
	History	"Historical information about the place" (Sevin, 2013, p. 231)	
	Inside	Place's physical attributes, amenities from a human viewpoint	
	Surroundings	Streetscape around urban public space	

	Bird's-Eye View	Aerial view of urban public space	
Activity	Events & Cultural Activities	"Local events" (Sevin, 2013, p. 231) and political/cultural activities	
	Sports & Recreational Activities	Sports, recreation, and outdoor activities happening at urban public space	
	Foods	"Food, recipes, cakes, drinks, etc." (Hu et al., 2014, p. 597)	
	Local Businesses	Information about local businesses around urban public space	
	Local Services	Information about "daily life, policies or initiative of place" (Sevin, 2013, p. 231)	
	Pets	"Animals like cats and dogs which are the main objects in the photo" (Hu et al., 2014, p. 597)	

Portrait	Individual	Self-portrait; “only one human face is presented in the photo” (Hu et al., 2014, p. 597)	
	Group	Family, friends or local residents; “... at least two human faces are in the photo” (Hu et al., 2014, p. 597)	

3.5.2 Codebook for Hashtag Categorization

As mentioned in Chapter 2, five broad hashtag categories were established based on previous research (Isabelle, 2018; Sheldon & Bryant, 2016; Erz et al., 2018), namely 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness* and 5) *city-relatedness*. Any subjects depicted in the picture, whether directly or abstractly, are considered as *content-related* tags (Isabelle, 2019). User’s emotional expression through hashtagging will be analyzed by two sets of subcategories, eight affective qualities of place from the literature: 1) *arousing*, 2) *exciting*, 3) *pleasant*, 4) *relaxing*, 5) *sleepy*, 6) *gloomy*, 7) *unpleasant*, and 8) *distressing* (Russell & Pratt, 1980), and three levels of sentiment as *positive or negative*, while posts not including any sentiment tags of *emotiveness* were categorized as *neutral*. The category of *documentiveness* involves hashtags including “all non-topical features of the photograph” (Isabelle, 2018, p. 53), such as any hashtags which serve documentation purposes, such as username, date, location, type of picture (Ingwersen, 2002), or technical aspects of the photograph such as type of camera or length of exposure (Stock & Stock, 2013). The fourth category of *performativeness* involves all hashtags applied for increasing localization and searchability of the photos, as well as those promoting a certain activity (Isabelle, 2019, p.

52). It involves *performative tags* (Peters & Stock, 2007), *stophashtags* (Giannoulakis & Tsapatsoulis, 2016), *time- and task-related tags* (Kipp, 2006), and *Insta-tags* (Isabelle, 2018). In response to the characteristics of hashtag usage in public space (Heyd & Puschmann, 2017), the category of *city-relatedness* was developed to capture the relationship between the collective image of place generated by the general public and the formation of urban identity on a visual social media platform, Instagram. Taking into account the hashtag behavior of users (Baranovic, 2013) and the pragmatic uses of hashtags (Caleffi, 2015) to delve into the relationship between UGC and the image of the city, three subcategories were developed for the *city-relatedness* category, 1) *city name*, 2) *other place*, and 3) *compound word*. Hashtags referring to New York City and acronyms/abbreviations of those hashtags, such as #newyork, #newyorkcity, #nyc, or #ny, were considered as belonging to the *city name* category. This category can provide direct evidence of the levels of connection between the image of the city illustrated by the general public and the formation of urban identity in the digital environment. The *other place* category helps to identify the relationship between the urban squares and recognized civic buildings, landmarks, or other public spaces within the city, described through hashtags such as #centralpark, #timesquare, #brooklynbridge, #thenewyorkpubliclibrary, #madisonsquaregarden, and #thestatueofliberty. The last subcategory of *city-relatedness*, *compound word*, was developed in response to a unique pattern of hashtag creation. Although single words are the most common type of hashtags, combinations of words and letters tend to carry more semantic and pragmatic load, often making suggestions or comments, expressing feelings or emotions (Caleffi, 2015), or even serving as a way of self-expression as "personalized hashtags." This type of hashtag varies widely in form, combining adjectives and nouns, and nouns/verbs, prepositional phrases, or even entire clauses. Tags such as #nyceats, #nycfood, #nycblogger, #parknyc, #lovenyc, and

#lifeinnewyork were considered in this category. In order to categorize varied combinations of hashtags, this study takes manual efforts on the hashtags associated with users' photographs publicly available on Instagram.

Table 3.7 Codebook for hashtag categorization (Adapted from Isabelle, 2018; Russell & Pratt, 1980; Sheldon & Bryant, 2016; Erz et al., 2018)

Category		**Explanation**	**Exemplary Hashtags**
Content-relatedness		"... everything a picture directly or abstractly depicts" (Isabelle, 2018, p. 51)	#friends, #dog, #food, #trees, #bench, #home, #farmersmarket, #yoga or #arts
Emotiveness	Arousing	Effective qualities of places/landscape (Russell & Pratt, 1980)	#arousing, #intense, #active, or #alive
	Exciting		#exciting, #sensational, #sensational, or #interesting
	Pleasant		#love, #happy, #nice, or #beautiful
	Relaxing		#relax, #peaceful, #calm, or #restful
	Sleepy		#sleepy, #lazy, #slow, or #inactive
	Gloomy		#dull, #boring, or #monotonous
	Unpleasant		#dissatisfying or #uncomfortable
	Distressing		#frenzied, #tense, or #hectic
Documentiveness		"... all non-topical features of a document" (Isabelle, 2018, p. 53)	#iphone (camera type), #username, #photographer, #sunday, #tbt, #holiday, #selfie, or #location
Performativeness		Metacommunicative hashtags used to increase the searchability and visibility of the photo	#like4like, #followmefollowyou, #f4f, #photooftheday, #regram, #igers or #instamood
City-relatedness	City name	Name of the city	#newyorkcity, #nyc, #ny, #bigapple
	Other place	Architecture, parks, attractions or landmarks that are not depicted in the photo	#empirestatebuilding, #centralpark, #thestatueofliberty, or #timessquare
	Compound word	Combination of city name and one or more words	#nyceats, #nycdining, #nyclife, #newyorker, #lifeinnewyork

3.5.3 Pretest

After the image and hashtag codebooks were developed, a pretest was conducted to ensure that both raters comprehended the guidelines and evaluation criteria of the codebooks. As discussed in Chapter 2, two coders were involved in the coding process in

order to achieve greater reliability (Amsden, Stedman, and Kruger, 2011). To bring in perspectives of both academia and industry, I as well as a practicing landscape architect based in Boston served as the raters for this study. Before the pretest was conducted, the codebooks and instructions were sent to the landscape architect via email in early November 2019. Subsequently, the detailed procedure for the categorization of images and hashtags was refined through a conference call. For this pretest, a total of 600 posts, 200 per each study site published in March and September 2019, were selected through systematic random sampling from the list of URLs attained by 4K Stogram.

The two raters conducted the pretest in mid-November 2019 with the 600 sample posts of the three urban public spaces. To verify the reliability of the coding process for content analysis, the two raters separately measured the variables on a categorical scale. To check interrater reliability, the data coded by the two raters were imported into a statistical software SPSS. As seen in Figure 3.6, the categorical variables of the hashtags were coded through a commonly used binary coding system called *dummy coding*, in which 1= yes and 0 = no.

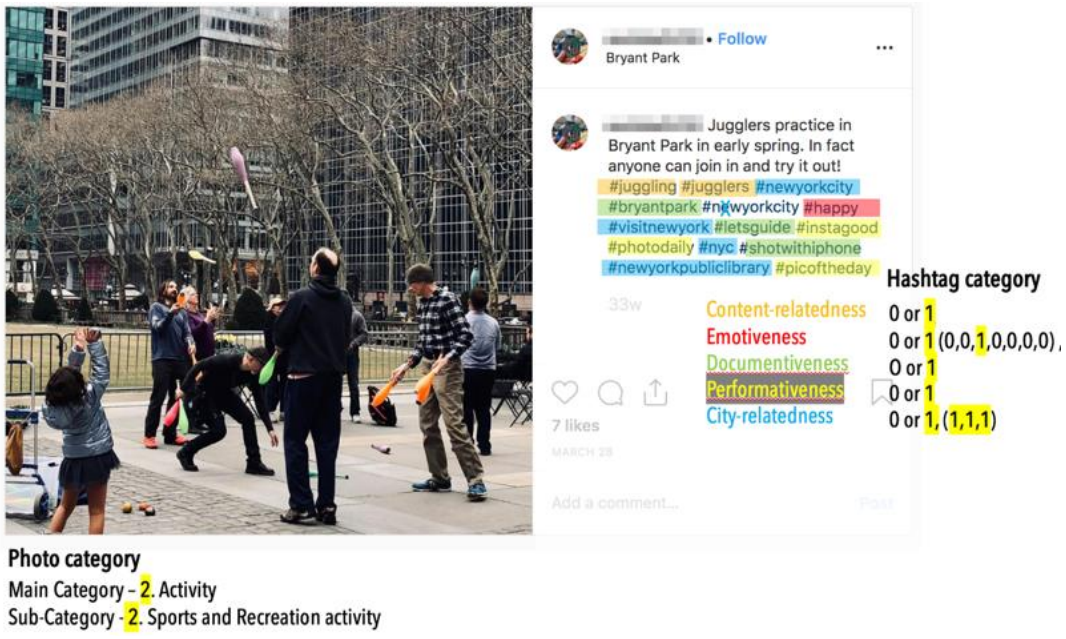

Figure 3.6 Coding process on the screenshot of an Instagram post

3.5.4 Interrater Reliability

The interrater reliability for categorization for user photographs and hashtags was estimated as the value of Cohen's Kappa Coefficient (k), a correlation statistic frequently used to measure interrater reliability. Because the data is categorized via a complex process involving two or more judges, the degree to which these judges agree, along with its significance and sampling stability, must be determined (Cohen, 1960). The values of this coefficient can be interpreted as follows: "values ≤ 0 as indicating no agreement and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement" (McHugh, 2012, p. 279). The preliminary value of Cohen's Kappa for the pretest was 0.90 on average, which falls into the range of *almost perfect* (0.81-1.00).

Table 3.8 Interpretation of Cohen's Kappa (McHugh, M. L., 2012, p. 279)

Value of Kappa	Level of Agreement	% of Data that Are Reliable
0 – .20	None	0 – 4%
.21 – .39	Minimal	4 – 15%
.40 – .59	Weak	15 – 35%
.60 – .79	Moderate	35 – 63%
.80 – .90	Strong	64 – 81%
Above .90	Almost Perfect	82 – 100 %

The kappa values for the photo categorization were 1.0 for the main photo category (*physical setting*, *activity*, or *portrait)* and 0.80 for photo subcategories. For the hashtags, Cohen's Kappa values were 0.98 for *content-relatedness* of the hashtags, 0.97 for *emotiveness*, 1.0 for *documentiveness*, 0.83 for *performativeness*, 0.86 for *city-relatedness*. For the subcategories of *city-relatedness* hashtags, the kappa value was 0.79 for *city name*, 0.83 for *other place*, and 0.82 for *compound word*. After completing the pretest, the two coders discussed areas of disagreement and clarified ambiguities, particularly in the assignment of photo subcategories and categories of *city-relatedness*, in order to increase the consistency of coding. Subsequently, the raters reached a consensus on all categorizations for images and hashtags of the sample data.

Table 3.9 Cohen's kappa value for photo and hashtag categories

	Measurement of Agreement			
	Kappa Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Photo & Hashtag	.905	.009	51.987	.000

Table 3.10 Cohen's kappa value for photo categories

Photograph Variables	**Measurement of Agreement**			
	Kappa Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Main category	1.000	.000	18.568	.000
Subcategory	.801	.035	22.950	.000

Table 3.11 Cohen's kappa value for hashtag categories

Hashtag Variables	**Measurement of Agreement**			
	Kappa Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Content-relatedness	.988	.012	13.077	.000
Emotiveness	.974	.025	13.144	.000
Documentiveness	1.000	.000	13.229	.000
Performativeness	.837	.042	11.068	.000
City-relatedness	.860	.054	10.656	.000
City name	.790	.047	10.451	.000
Other place	.839	.041	11.100	.000
Compound word	.827	.043	11.185	.000

The results of the two raters were compared using Cohen's kappa Coefficient, which had a value of 0.87, indicating the level of *strong.* In order to create a single series of codes for quantitative analysis, the raters subsequently discussed how to achieve consensus in all cases.

3.6 Statistical Procedures for Data Analysis

Following the coding of the sample, quantitative methods were applied to answer the research questions. To interpret the data obtained from the coding procedure, SPSS version 26 was used to conduct statistical analysis. This analysis was intended to explore a

collective sense of place of urban public space via UGC in relation to their physical/social attributes, affective qualities, urban identity, and temporal variations such as season and month. A series of chi-square tests were conducted to examine the relationships between categorical variables among photo category, hashtag category, study site, and season/month to answer to each research question. To determine strengths of association for the chi-square tests, Cramér's *V* was measured to calculate correlation across contingency tables of varying sizes.

To summarize patterns and determine the landscape of overall user perceptions in urban public space, descriptive statistics were calculated. The researcher used descriptive statistics to report the distributions of UGC by photograph and hashtag category, as well as the seasonal and monthly distributions of the sample population by urban public space, photograph, and hashtag category. In addition, the proportion of the total sample and associated category for each variable in the dataset were described.

Chi-square tests were run to determine the associations between categorical variables for each research question. The researcher used a set of chi-square tests to determine any significant associations between two variables, such as main photo category and hashtag categories. In this quantitative approach, a significance level of 95% was applied for all statistical procedures, and Cramér's *V* was used as a post-test to identify strengths of association between two variables. Cramér's *V* is often used to compare multiple chi-square statistics and has the added advantage of not being influenced by sample size (Crewson, 2015). To interpret the value of the coefficient, which ranges from 0 to 1, the researcher applied Crewson's (2015) suggestion that "a Cramér's *V* of .10 may provide a good minimum threshold for suggesting there may be a substantive relationship between two variables" (p. 79).

Table 3.12 Interpretation of Cramér's *V* (Crewson, 2015, p. 79)

Value of Cramér's *V*	Level of Agreement
0 – .10	Little if any association
.10 – .30	Low association
.30 – .50	Moderate association
Above .50	High association

3.7 Summary

This chapter explained the rationale and procedures for the content analysis approach used to achieve the objectives of this study. The research sites were selected by three criteria 1) featured by NYC Parks (2018) in the "List of New York City Parks" in Manhattan, 2) at least 30,000 posts on Instagram over the one-year period of data collection for this study, and 3) similar urban context, land use, and demographic features utilizing "Mapping Segregation" (The New York Times, 2019) and Zoning & Land Use Map (New York City, 2019). This study utilizes the software 4K Stogram to collect a list of Instagram posts, between October 2018 and September 2019, from three New York City urban public spaces, Bryant Park, Madison Square Park, and Union Square. For this research, a total of 1,200 posts were selected by systematic random sampling. This study started with a qualitative phase, employing manual categorization techniques for visual and textual data of user-generated content (UGC) associated with three urban public spaces on Instagram. In addition to the development of codebooks for user-generated photographs and the associated hashtags of UGC, criteria for data preparation, coding procedures, and interrater reliability were also described. The second phase employed a quantitative approach to answer each research question for this study.

CHAPTER FOUR: RESULTS

This chapter reports the results of this study conducted based on methods as presented in Chapter 3. As addressed in Chapter 3, the primary objectives of this study were to identify a collective sense of place of urban public spaces on social media platforms, particularly the photo-sharing platform Instagram. This study also aims to explore the characteristics of user-generated content (UGC) for understanding sense of place for a particular urban public, including the relationship between emotional value, urban identity, distinctiveness and seasonality in UGC. As indicated in Chapter 3, a total of 1,200 geotagged posts, 400 each from Bryant Park, Madison Square Park, and Union Square in New York City posted over a one-year period from October 2018 to September 2019, were selected by systematic random sampling for this analysis. The chapter is organized into six sections. This section starts with a descriptive analysis of the sample by photo and hashtag category for each research site. Consequently, the results of a series of chi-square tests will be described in relation to each research question.

4.1 Descriptive Statistics of Sample

4.1.1 Photo Categories of User-Generated Content in Urban Public Spaces

As shown in Table 4.1.1, each post was assigned to one of the three categories of photograph, *physical setting*, *activity*, or *portrait*. Overall, the most popular type of user-generated photograph across all the research sites was *physical setting* at more than half (51.5%), followed by 30.2% in *activity*, while 18.3% are *portraits* of people. Looking at the number of photographs in each category (*physical setting*, *activity*, *portrait*), each site presents the same sequence of categories in terms of frequency, although the number of images per element varies; for instance, in Bryant Park, photographs of *portrait* appear in a greater proportion of posts at 23.8% (n=95) compared to the other two locations,

Madison Square Park (15.8%, n=63) and Union Square (15.5%, n=62). Madison Square Park, meanwhile, provides a larger portion of *physical setting* posts at 62.5% (n=250) than the other sites, Bryant Park (49.0%, n=196) and Union Square (43%, n=172). Posts of *activity* appear most popular at Union Square (41.5%, n=166), compared to the number at Bryant Park (27.3%, n=109) and Madison Square Park (21.8%, n=87).

Table 4.1.1 Distribution of photo category by place

Photo Category	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Physical setting	196	250	172	618
% within Place	(49.0)	(62.5)	(43.0)	
% of Total	(16.3)	(20.8)	(14.3)	(51.5)
Activity	109	87	166	362
% within Place	(27.3)	(21.8)	(41.5)	
% of Total	(9.1)	(7.2)	(13.8)	(30.2)
Portrait	95	63	62	220
% within Place	(23.8)	(15.8)	(15.5)	
% of Total	(7.9)	(5.3)	(5.2)	(18.3)
Total	400	400	400	1200
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	(100)

As shown in Figure 4.1.1, it appears that the physical environment of public outdoor spaces, including surrounding areas, form a crucial part of content shared on social media. This result is most apparent in Madison Square. On the other hand, photos that capture dynamic activities and cultural elements are prime content for Union Square on Instagram. Bryant Park displays the highest proportion of portraits in the user-generated content among the three sites. Despite this variability in the image categories between sites, the sequence of categories remains consistent; within each location, *physical setting* is the most popular, followed by *activity*, followed by *portrait*.

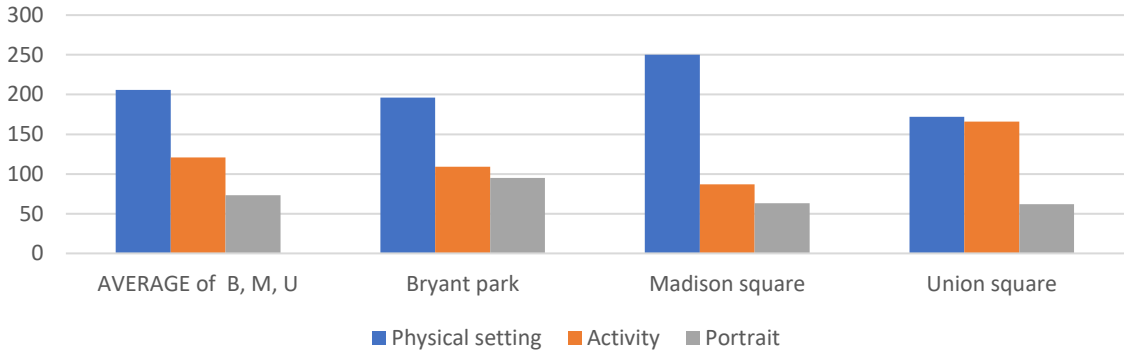

Figure 4.1.1 Distribution of photo category by place.

In terms of subcategories, the first category of image, *physical setting*, consists of seven subcategories, namely 1) *weather*, 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surroundings*, and 7) *bird's-eye view*. As shown in Table 4.1.2, the majority of the sample in *physical setting* depicted either the physical attributes, amenities, or scenic views of the place itself (45%, n=278) or the streetscape around the urban public space (29%, n=181).

Figure 4.1.1 reveals the proportion of subcategories of *physical setting* per each study site; the largest portion was in *inside* observed at three-fifths (n=117) in Bryant Park, followed by *surroundings* (22%, n=44), while the subcategories of *arts* (2.3%, n=9) and *bird's-eye view* (0.3%, n=4) comprise the least portion of the sample in Bryant Park. The nearby architecture and cityscape was captured the most at Madison Square Park (6.5%, n=26) in relation to the other research sites, 3.3% (n=13) for Bryant Park and 2.5% (n=10) for Union Square. Images of surroundings were more common (14.8%, n=59) among the user-generated photographs at Madison Square than those in the other locations. For Union Square, photos of arts showed the most at 5.3% (n=21) in comparison to the other research sites, Bryant Park and Madison Square Park at 2.3% (n=9) and 4.5% (n=18) respectively.

Table 4.1.2 Distribution of subcategory of *physical setting* by place

Physical Setting	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Weather	8	7	10	25
% within P_S1	(2.0)	(1.8)	(2.5)	
% of Total	(0.7)	(0.6)	(0.8)	(2.1)
Arts	9	18	21	48
% within P_S1	(2.3)	(4.5)	(5.3)	
% of Total	(0.5)	(1.8)	(2.5)	(4.0)
Architecture	13	26	10	49
% within P_S1	(3.3)	(6.5)	(2.5)	
% of Total	(1.1)	(2.2)	(0.8)	(4.1)
History	1	0	5	6
% within P_S1	(0.3)	(0.0)	(1.3)	
% of Total	(0.1)	(0.0)	(0.4)	(0.5)
Inside	117	115	46	278
% within P_S1	(29.3)	(28.7)	(11.5)	
% of Total	(9.8)	(9.6)	(3.8)	(23.2)
Surroundings	44	78	59	181
% within P_S1	(11.0)	(19.5)	(14.8)	
% of Total	(3.7)	(6.5)	(4.9)	(15.1)
Bird's-eye view	4	6	22	32
% within P_S1	(0.3)	(0.5)	(1.8)	
% of Total	(1.0)	(1.5)	(5.5)	(2.7)
Does not belong to the subcategory	204	150	227	581
% within P_S1	(51.0)	(37.5)	(56.8)	
% of Total	(17.0)	(12.5)	(18.9)	(48.4)
Total	400	400	400	1200
% within P_S1	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	(100)

In the case of photos of *physical setting*, users focus mainly on the natural and built environment of the site and the adjacent cityscape when sharing content on Instagram. In addition, as shown in Figure 4.1.2, the specific subject of *physical setting* photographs varies based on the unique characteristics of each site.

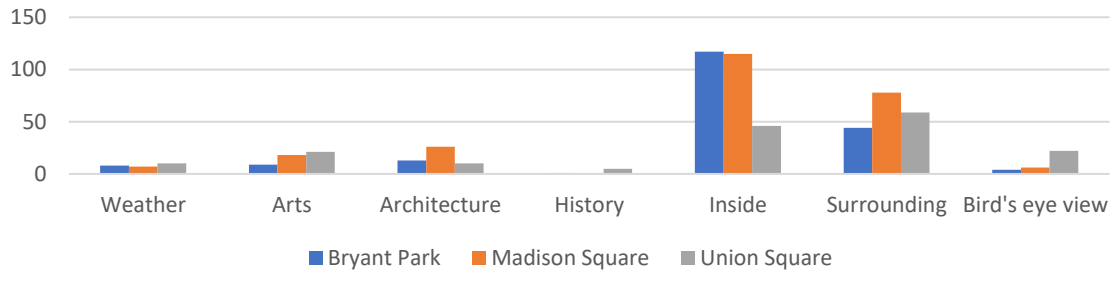

Figure 4.1.2 Distribution of subcategory of *physical setting* by place

As shown in Table 4.1.3, the second category of image, *activity*, comprised six subcategories, namely 1) *events & cultural activities*, 2) *sports & recreational activities*, 3) *foods*, 4) *local businesses*, 5) *local services*, and 6) *pets*. Overall, 46% of the sample in the *activity* category illustrated *events & cultural activities*, with 30% (n=33) at Bryant Park, 40% (n=29) at Madison Square Park, and 64% (n=106) at Union Square. As shown in Figure 4.1.3, a significant part of the Bryant Park dataset (27%, n=29) exhibits *sports & recreational activities*, in contrast to the other urban spaces, Madison Square Park (5%, n=5) and Union Square (2%, n=3). *Events & cultural activities*, meanwhile, form a smaller portion of the posts in Bryant Park (30%, n=33) than in Madison Square Park (40%, n=29) or Union Square (64%, n=106). In Madison Square Park, photographs of *pets* (26%, n=25) could be observed to rank second on the number of posts after *events & cultural activities*; that is relatively larger than the other urban spaces, Bryant Park (6%, n=6) and Union Square (5%, n=8). Lastly, 64% of the sample in *activity* presented *events & cultural activities* in Union Square (n=106), which is almost double that of the other places, Bryant Park (30%, n=33) and Madison Square Park (40%, n=29).

Table 4.1.3 Distribution of subcategory of *activity* by place

Activity	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Events & cultural activities	33	29	106	168
% within Place	(8.3)	(7.2)	(26.5)	
% of Total	(2.8)	(2.4)	(8.8)	(14.0)
Sports & recreational activities	29	5	3	37
% within Place	(7.2)	(1.3)	(0.8)	
% of Total	(2.4)	(0.4)	(0.3)	(3.1)
Foods	26	15	26	67
% within Place	(6.5)	(3.8)	(6.5)	
% of Total	(2.2)	(1.3)	(2.2)	(5.6)
Local businesses	7	12	18	37
% within Place	(1.8)	(3.0)	(4.5)	
% of Total	(0.6)	(1.0)	(1.5)	(3.1)
Local services	8	1	5	14
% within Place	(2.0)	(0.3)	(1.3)	
% of Total	(0.7)	(0.1)	(0.4)	(1.2)
Pets	6	25	8	39
% within Place	(1.5)	(6.3)	(2.0)	
% of Total	(0.5)	(2.1)	(0.7)	(3.3)

Does not belong to subcategory	291	313	234	838
% within Place	(72.8)	(78.3)	(58.5)	
% of Total	(24.3)	(26.1)	(19.5)	(69.8)
Total	400	400	400	
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	

In terms of subcategory of *activity*, users turned out to mainly share photos that captured the cultural and community events that took place at the site. As observed in Figure 4.1.3, the amount of content posted online for each *activity* type varies greatly by location based on the various activities that occur at each site. The greatest variation between sites in the *activity* category can be seen in photos categorized as *events & cultural activities.*

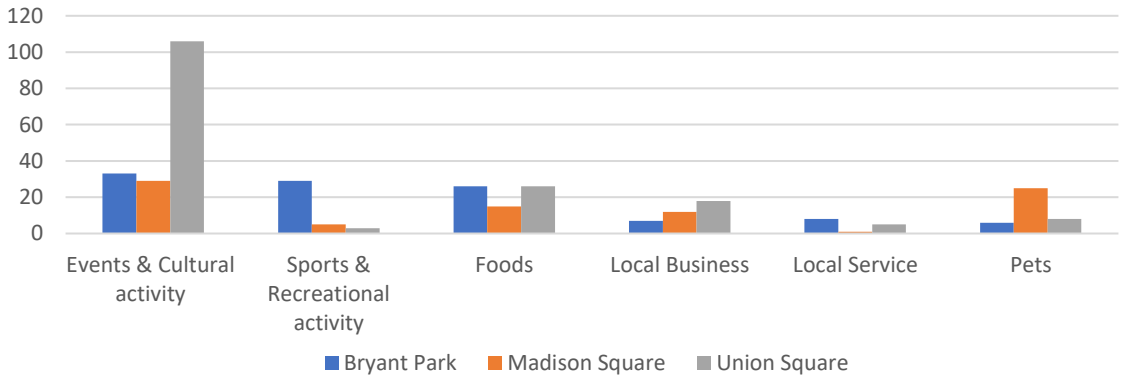

Figure 4.1.3 Distribution of subcategories of *activity*

The third category of photograph, *portrait*, is divided into two subcategories, 1) *individual* and 2) *group.* About one-fifth of the user-generated photographs taken at the research sites were *portraits*, 23.8% (n=95) for Bryant Park, 15.8% (n=63) for Madison Square Park, and 16% (n=64) for Union Square. Looking at subcategories of *portraits*, photographs of *individuals* (54%, n=119) occupy slightly more than half of the data in *portrait* while *group* portraits comprised 46% (n=103), as shown in Figure 4.1.4. The same patterns are observed throughout the three sites for this study. The number of *individual* images is higher in all three research sites, Bryant Park (51%, n=48), Madison Square Park (56%, n=35), and Union Square (56%, n=36) than the number of *group*

portraits, Bryant Park (49%, n=47), Madison Square Park (44%, n=28), and Union Square (44%, n=28). In both *individual* and *group* types, Bryant Park shows the largest counts among the research sites; an especially prominent difference is shown in the number of *group* portraits at this site.

Table 4.1.4 Distribution of subcategories of *portrait* by place

Subcategory of Portrait	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Individual	48	35	36	119
% within Place	(12.0)	(8.8)	(9.0)	
% of Total	(4.0)	(2.9)	(3.0)	(9.9)
Group	47	28	28	103
% within Place	(11.8)	(7.0)	(7.0)	
% of Total	(3.9)	(2.3)	(2.3)	(8.6)
Does not belong to subcategory	305	337	336	978
	(76.3)	(84.3)	(84.0)	
% within Place	(25.4)	(28.1)	(28.0)	(81.5)
% of Total				
Total	400	400	400	
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	

Images of single people are observed in greater quantity than *group* photos in all three squares, but this difference is slight compared to the discrepancies within other categories such as *physical setting* and *activity*. It appears that users tend to share more *portraits* at Bryant Park than at the two other locations, and that the quantity of images, whether taken as selfies or with friends and family members, show a consistent ratio on Instagram.

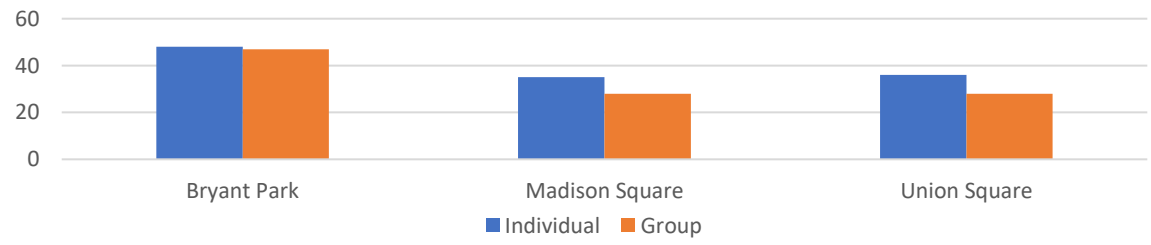

Figure 4.1.4 Distribution of subcategories of *portrait* by place.

4.1.2 Hashtag Categories of User-Generated Content in Urban Public Spaces

To classify the hashtags assigned to the set of 1,200 user-generated photographs, five categories were applied, namely, 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness*, and 5) *city-relatedness*. Each individual post was then scored either 0= no or 1= yes corresponding to the five categories of hashtag for this study. 73.6% of the sample (n=883) contained *documentiveness* hashtags, followed by *content-relatedness* and *city-relatedness* hashtags at 71.2% (n=854) and 71.0% (n=852) respectively. A less significant portion of the sample involved hashtags of *emotiveness* (22.1%, n=256) and *performativeness* (16.7%, n=200) than the three other categories addressed above. As shown in Table 4.1.5, similar patterns of hashtag usage were observed throughout the three urban squares.

Table 4.1.5 Distribution of hashtag category by place

Hashtag Category	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Content-relatedness	263	286	305	854
% within Place	(65.8)	(71.5)	(76.3)	
% of Total	(21.9)	(23.8)	(25.4)	(71.2)
Emotiveness	98	90	77	265
% within Place	(24.5)	(22.5)	(19.3)	
% of Total	(8.2)	(7.5)	(6.4)	(22.1)
Documentiveness	302	279	302	883
% within Place	(75.5)	(67.8)	(75.5)	
% of Total	(25.2)	(23.3)	(25.2)	(73.6)
Performativeness	67	71	62	200
% within Place	(16.8)	(17.8)	(15.5)	
% of Total	(5.6)	(5.9)	(5.2)	(16.7)
City-relatedness	294	283	275	852
% within Place	(73.5)	(70.8)	(68.8)	
% of Total	(24.5)	(23.6)	(22.9)	(71.0)

As displayed in Figure 4.1.5, users show similar patterns of hashtag utilization in the three sites. Content-related subjects, contextual information, the location of the city—New York City in this case—and landmarks and features located in the city were the primary words used as hashtags for the imagery taken at the urban public spaces.

However, relatively few hashtags were seen to express emotions.

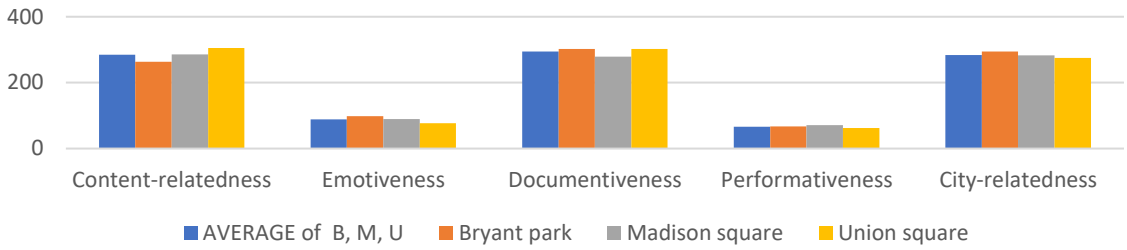

Figure 4.1.5 Distribution of hashtag category by place.

4.2 Relationship between User Photographs and Hashtag Category

To further understand the patterns of hashtags associated with the user-generated content (UGC), chi-square tests of independence were performed to determine if there were any significant associations between photo categories and hashtag categories that were assigned by visitors in the dataset of 1,200 screenshots. The two categorical variables were photo category and hashtag category. The first had three types, 1) *physical setting*, 2) *activity*, and 3) *portrait*, while the second had five types, 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness*, and 5) *city-relatedness*.

As displayed in Table 4.2.1, there were significant relationships between photo category and three hashtags types, namely *content-relatedness*, $\chi^2(2, N=1200) = 52.067$, $p < .001$, Cramér's $V = .21$; *documentiveness*, $\chi^2(2, N=1200) = 9.626$, $p < .01$, Cramér's $V = .09$; and *city-relatedness*, $\chi^2(2, N=1200) = 26.486$, $p < .001$, Cramér's $V = .14$. The results of the chi-square test showed no significant relationship between photo category and hashtags of *emotiveness*, $\chi^2(2, N=1200) = 3.376$, $p = .185$, Cramér's $V = .05$ or *performativeness*, $\chi^2(2, N=1200) = 4.657$, $p = .098$, Cramér's $V = .21$. Therefore, the three most-scored hashtag types, *content-relatedness*, *documentiveness*, and *city-relatedness*, each indicated a significant relationship to the main image categories.

Table 4.2.1 Chi-square tests for a collective sense of place on Instagram: Hashtag category by photo category.

Hashtag Category	**Photo Category**			
	Physical Setting	Activity	Portrait	Chi-Square Test
Content-relatedness % within **Place** **% of Total**	392 (63.4) (32.7)	311 (85.9) (25.9)	151 (68.6) (12.6)	$\chi^2(2)=52.067$ p <.001 φ = .21 n =1200
Emotiveness % within Place % of Total	135 (21.8) (11.3)	72 (19.9) (6.0)	58 (26.4) (4.8)	$\chi^2(2)=3.376$ p =.185 φ = .05 n =1200
Documentiveness % within Place % of Total	477 (77.2) (39.8)	258 (71.3) (21.5)	148 (67.3) (12.3)	$\chi^2(2)=9.626$ p <.01 φ = .09 n =1200
Performativeness % within Place % of Total	108 (17.5) (9.0)	66 (18.2) (5.5)	26 (11.8) (2.2)	$\chi^2(2)=4.654$ p =.098 φ = .06 n =1200
City-relatedness % within Place % of Total	478 (77.3) (39.8)	226 (62.4) (15.3)	148 (67.3) (10.9)	$\chi^2(2)=26.483$ p <.001 φ = .14 n =1200

It is observed that people tend to utilize *content-relatedness* hashtags more on the photographs of *activity* including events or cultural activities that take place there. In addition, hashtags that indicate *documentiveness* and those that express ideas about the city, *city-relatedness*, are utilized significantly most on the images that depicts the specific physical attributes of a location. In contrast, the utilization of the three highest-scored types, *content-relatedness, documentiveness, and city-relatedness*, of hashtags for *portrait* photos showed relatively even distribution compared to the other types of photographs.

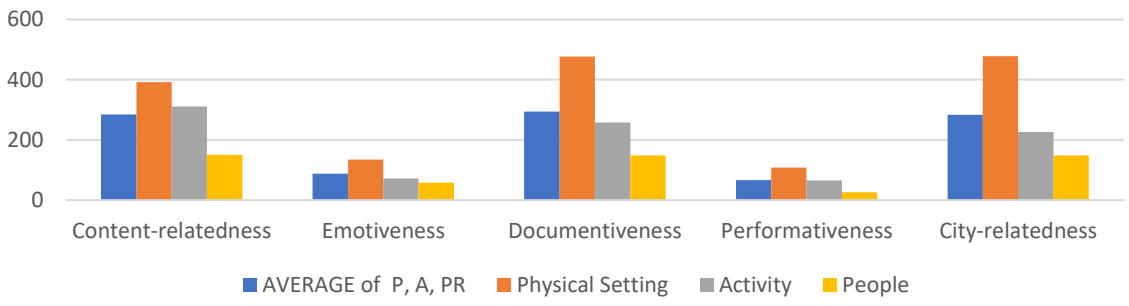

Figure 4.2.1 Distribution of hashtag category by photo category.

Subsequently, the relationships of hashtag usage to subcategories of each of the main photo categories, *physical setting, activity,* and *portrait*, were examined. Firstly, chi-square tests of independence were performed to examine the relationship between subcategories of the *physical setting* photos and hashtag category. The two categorical variables were *physical setting* subcategory with seven types, 1) *weather,* 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surroundings*, and 7) *bird's-eye view* and the hashtag category with five types as listed above. As shown in Table 4.2.2, the relationships between *physical setting* and hashtag categories of *content-relatedness*, *documentiveness*, and *city-relatedness* were significant; the values of the chi-square tests were as follows: $\chi^2(7, N=1200) = 58.716$, $p < .001$, Cramér's $V = .22$ for *content-relatedness*; $\chi^2(7, N=1200) = 18.099$, $p < .05$, Cramér's $V = .12$. for *documentiveness*; and $\chi^2(7, N=1200) = 34.360$, $p < .001$, Cramér's $V = .16$ for *city-relatedness*. There was no significant association between the *physical setting* category and hashtags showing *emotiveness*, $\chi^2(7, N=1200) = 1.465$, $p = .984$, Cramér's $V = .03$, or *performativeness*, $\chi^2(7, N=1200) = 1.852$, $p = .984$, Cramér's $V = .03$. In turn, the relationship between subcategories of *physical setting* and hashtag category revealed similar patterns to those between photo category and hashtag category discussed above. User photos of *inside* and *surroundings* revealed the largest portions of the three most-used types of hashtag, showing significant relationships. 62.9% (n=175) photos of *inside* and 58.0% (n=105) of those of *surroundings* contained hashtags of *content-relatedness*. User photographs that depicted the *inside* or *surroundings* of the research sites contained more than 70% of *documentiveness* (80.9%, n=225 for *inside*; 71.8%, n=130 for *surroundings*) and *city-relatedness* hashtags (75.2%, n=209 for *inside*; 80.1%, n=145 for *surroundings*) respectively.

Table 4.2.2 Hashtag category by subcategory of *physical setting*

Hashtag Category	Physical Setting								
	Weather	Arts	Architecture	History	Inside	Surroundings	Bird's-eye view	Does not belong to category	Chi-Square Test
Content-relatedness % within P_S1 % of Total	24 (96.0) (2.0)	34 (70.8) (2.8)	29 (59.1) (2.4)	2 (33.3) (0.2)	175 (62.9) (14.6)	105 (58.0) (8.8)	24 (7.5) (2.0)	461 (79.3) (38.4)	$\chi^2(7)=58.716$ p <.001 φ = .22 n =1200
Emotiveness % within_P_S1 % of Total	6 (24.0) (0.5)	10 (20.8) (0.8)	10 (20.4) (0.8)	1 (16.7) (0.1)	66 (23.7) (5.5)	36 (19.9) (3.0)	6 (18.8) (0.5)	130 (22.4) (10.8)	$\chi^2(7)=1.465$ p =.984 φ = .35 n =1200
Documen-tiveness % within P_S1 % of Total	18 (72.0) (1.5)	33 (68.8) (2.8)	39 (79.6) (3.3)	6 (100.0) (0.5)	225 (80.9) (18.8)	130 (71.8) (10.8)	27 (84.4) (2.3)	405 (69.7) (33.8)	$\chi^2(7)=18.099$ p <.05 φ = .12 n =1200
Performa-tiveness % within P_S1 % of Total	4 (16.0) (0.3)	7 (14.6) (0.%)	10 (20.4) (0.8)	1 (16.7) (0.1)	52 (18.7) (4.3)	29 (16.0) (2.4)	5 (15.6) (0.4)	92 (15.8) (7.7)	$\chi^2(7)=1.852$ p =.984 φ = .03 n =1200
City-relatedness % within P_S1 % of Total	20 (80.0) (1.7)	30 (62.5) (2.5)	44 (89.8) (3.7)	5 (83.3) (0.4)	209 (75.2) (17.4)	145 (80.1) (12.1)	25 (78.1) (2.1)	374 (64.4) (31.2)	$\chi^2(7)=34.360$ p <.001 φ = .16 n =1200

As shown in Figure 4.2.2, people sharing views and experiences of the *inside* of the square utilized mostly three types of hashtag, with those indicating documentative information being the most common. *Surroundings*, the second most frequent subcategory of *physical setting* UGC, includes views of the adjacent streets around the square. Among the three common hashtags associated with this content, *city-related* hashtags were the most frequently used. Along with photos and content reflecting the views of the surrounding area, images that include adjacent architecture are also highly utilized for city-related hashtags.

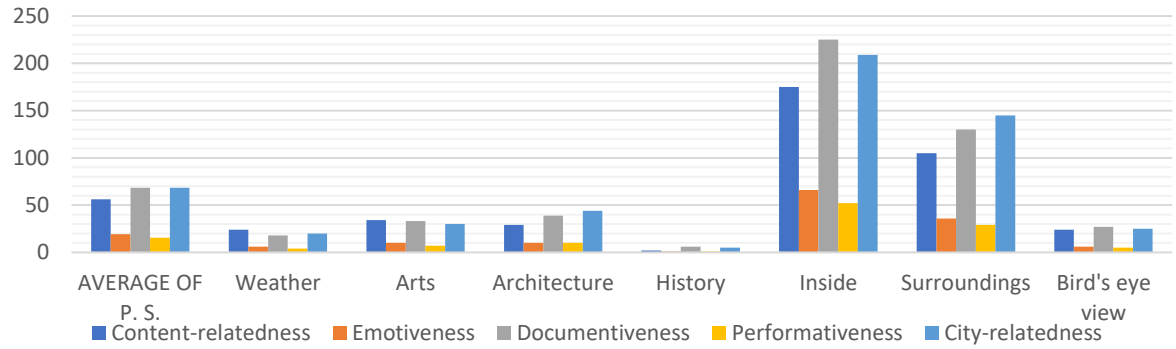

Figure 4.2.2 Distribution of subcategory of *physical setting* by hashtag category.

Next, chi-square tests of independence were performed to examine the relationship between *activity* subcategory and hashtag category. The two categorical variables were *activity* subcategory with six types, 1) *events & cultural activities*, 2) *sports & recreational activities*, 3) *foods*, 4) *local businesses*, 5) *local services*, and 6) *pets* and hashtag category with five types. The results of the chi-square tests show significant relationships between the subcategory of *activity* and three categories of hashtag, *content-relatedness*, *emotiveness*, and *city-relatedness*. The values of the chi-squares are as follows: $\chi^2(6, N=1200) = 57.589$, $p < .001$, Cramér's $V = .21$ for *content-relatedness*; $\chi^2(6, N=1200) = 25.650$, $p < .001$, Cramér's $V = .14$ for *emotiveness*; and $\chi^2(6, N=1200) = 32.182$, $p < .001$, Cramér's $V = .16$ for *city-relatedness*. In contrast, there was no significant association between the *activity* category and *documentiveness*, $\chi^2(6, N=1200) = 9.398$, $p = .152$, Cramér's $V = .08$, or *performativeness*, $\chi^2(6, N=1200) = 29.493$, $p < .002$, Cramér's $V = .15$. As seen in Table 4.2.3, this result represents a difference from the previous two sets of chi-square tests, which tested the relationships between *photo* and hashtag, and *physical setting* and hashtag; the two relationships demonstrated significant relationships to three most frequently used types of hashtag, *content-relatedness*, *documentiveness*, and

city-relatedness. Users' photographs of *activity* showed an association with *emotiveness* hashtags, but no significant relationship to *documentiveness* hashtags.

Table 4.2.3 A chi-square test for a collective sense of place on Instagram: Hashtag category by *activity* subcategory of photograph

Hashtag Category	**Activity Subcategory**							
	Events & cultural activities	Sports & recreational activities	Foods	Local businesses	Local services	Pets	Does not belong to category	Chi-Square Test
Content-relatedness % within P_S2 % of Total	148 (88.1) (12.3)	31 (83.8) (2.6)	55 (82.1) (4.6)	32 (86.5) (2.7)	10 (71.4) (0.8)	35 (89.7) (2.9)	543 (64.8) (45.3)	$\chi^2(6)=57.589$ p <.001 φ = .21 n =1200
Emotiveness % within P_S2 % of Total	30 (17.9) (2.5)	9 (24.3) (0.8)	13 (19.4) (1.1)	2 (5.4) (0.2)	0 (0.0) (0.0)	18 (46.2) (1.5)	193 (23.0) (16.1)	$\chi^2(6)=25.650$ p <.001 φ = .14 n =1200
Documen-tiveness % within P_S2 % of Total	111 (66.1) (9.3)	31 (83.8) (2.6)	50 (74.6) (4.2)	30 (81.1) (2.5)	9 (64.3) (0.8)	27 (69.2) (2.3)	625 (74.6) (52.1)	$\chi^2(6)=9.398$ p =.152 φ = .08 n =1200
Performa-tiveness % within P_S2 % of Total	20 (10.0) (1.7)	9 (4.5) (0.8)	11 (5.5) (0.9)	5 (2.5) (0.4)	3 (5.5) (0.3)	18 (9.0) (1.5)	134 (67.0) (11.2)	$\chi^2(6)=29.493$ p <.001 φ = .15 n =1200
City-relatedness % within P_S2 % of Total	96 (57.1) (8.0)	27 (73.0) (2.3)	46 (68.7) (3.8)	29 (78.4) (2.4)	9 (64.3) (0.8)	19 (48.7) (1.6)	626 (74.7) (52.2)	$\chi^2(6)=32.182$ p <.001 φ = .16 n =1200

Among the *activity* photos taken and shared in the squares, the most common were photographs of community cultural events such as flea markets. Unlike photos of *physical setting* which showed views of the surroundings or environment, users' photographs of dynamic activities demonstrate a clear relationship with hashtags that express emotions, *emotiveness*, or facilitate meta-communication, *performativeness*.

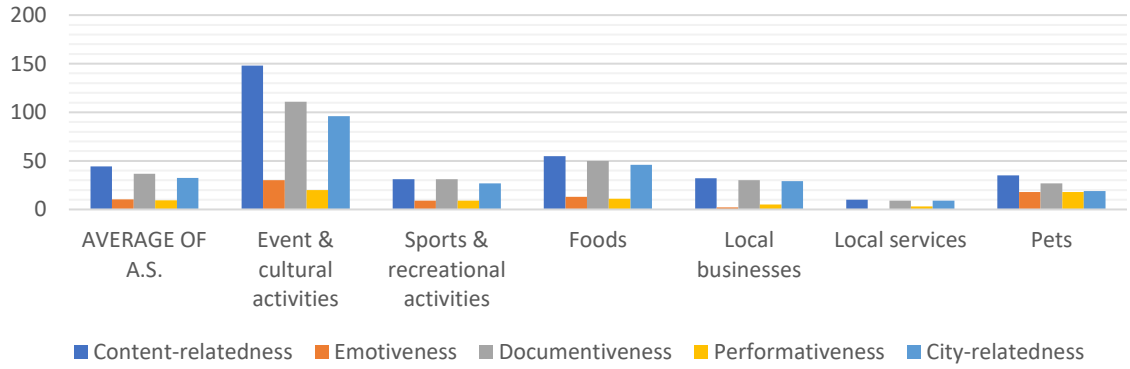

Figure 4.2.3 Distribution of subcategory of *activity* by hashtag category.

Lastly, chi-square tests were performed to examine the relationship between the *portrait* subcategory of photograph and hashtag category. The two categorical variables were *portrait* subcategory with two types, 1) *individual* and 2) *group*, and hashtag with five types. As shown in Table 4.2.4, the relationship between the *portrait* category and *documentiveness* was significant, $\chi^2(2, N=1200) = 7.998$, $p < .05$, Cramér's $V = .82$; however, the findings revealed no significant association between *portrait* and any of the four other categories of hashtag. The value of the chi-square test was $\chi^2(2, N=1200) = 0.992$, $p = .069$, Cramér's $V = .02$ for the relationship between *portrait* and *content-relatedness*; $\chi^2(2, N=1200) = 0.992$, $p = .069$, Cramér's $V = .02$ and $\chi^2(2, N=1200) = 3.474$, $p = .176$, Cramér's $V = .05$ for the relationship between *portrait* and *emotiveness*; $\chi^2(2, N=1200) = 4.930$, $p = .085$, Cramér's $V = .06$ and $\chi^2(2, N=1200) = 4.930$, $p = .085$, Cramér's $V = .06$ for the relationship between *portrait* and *performativeness*; and $\chi^2(2, N=1200) = 4.930$, $p = .085$, Cramér's $V = .06$ and $\chi^2(2, N=1200) = 2.523$, $p = .283$, Cramér's $V = .04$ for the relationship between *portrait* and *city-relatedness*. These results stand in contrast to the relationship between *activity* photos and hashtag category, which revealed no significant relationship to *documentiveness* hashtags. In addition, there was no significant relationship between *portrait* images and two of the most frequently used

hashtags in the sample, *content-relatedness* and *city-relatedness*, while both of these hashtag categories showed significant relationships to *photo* category and *physical setting* subcategory.

Table 4.2.4 Chi-square tests for a collective sense of place on Instagram: Hashtag category by portrait subcategory of photograph

Hashtag Category	**Portrait Subcategory**			
	Individual	Group	Does not belong to category	Chi-Square Test
Content-relatedness % within P_S3 % of Total	82 (68.9) (6.8)	70 (68.0) (5.8)	702 (71.8) (58.5)	$\chi^2(2)=0.991$ p =.069 φ = .02 n =1200
Emotiveness % within P_S3 % of Total	30 (25.2) (2.5)	29 (28.2) (2.4)	206 (21.1) (17.2)	$\chi^2(2)=3.474$ p =.176 φ = .054 n =1200
Documentiveness % within P_S3 % of Total	86 (72.3) (7.2)	64 (62.1) (5.3)	733 (74.9) (61.1)	$\chi^2(2)=7.988$ p <.05 φ = .08 n =1200
Performativeness % within P_S3 % of Total	10 (10.9) (8.8)	13 (12.6) (1.1)	174 (17.8) (14.5)	$\chi^2(2)=4.930$ p =.085 φ = .064 n =1200
City-relatedness % within P_S3 % of Total	80 (67.2) (6.7)	68 (66.0) (5.7)	704 (72.0) (58.7)	$\chi^2(2)=2.523$ p =.283 φ = .046 n =1200

In short, *portrait* photos taken in the squares showed correlation to hashtag categories other than *documentiveness*. The hashtags of *documentativeness* are widely utilized for *portraits* taken in squares, including selfies and photos with friends.

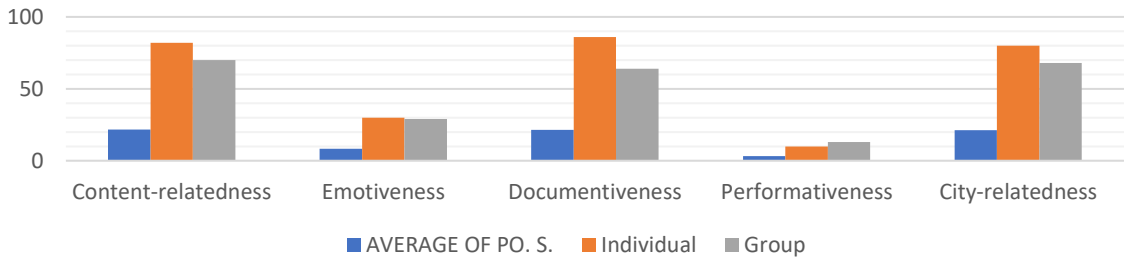

Figure 4.2.4 Distribution of subcategory of *portrait* by hashtag category.

4.3 Emotiveness Hashtags on User-Generated Content

In order to examine the viability of hashtags for understanding emotional values perceived in urban public spaces, two sets of emotional hashtag categories were developed and further analyzed through chi-square tests. The sample data was scored by two criteria: eight affective qualities, 1) *arousing*, 2) *exciting*, 3) *pleasant*, 4) *relaxing*, 5) *sleepy*, 6) *gloomy*, 7) *unpleasant*, and 8) *distressing* and three levels of sentiment, 1) *positive*, 2) *neutral*, and 3) *negative*. 19.2% of the hashtags in the *emotiveness* category were classified as *pleasant* (n=230), followed by 2.9% (n=35) of hashtags belonging to the affective quality of *exciting*. As shown in Table 4.3.1, significant numbers of hashtags were not observed to fall under the other affective qualities, *relaxing* (1.3%, n=15), *arousing* (0.6%, n=7), *sleepy* (0.1%, n=1), *gloomy* (0%, n=0), *unpleasant* (0%, n=0), or *distressing* (0%, n=0).

Table 4.3.1 Distribution of *affective quality* by place

Affective Quality of Place	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Arousing	4	2	1	7
% within Place	(1.0)	(0.5)	(0.3)	
% of Total	(0.3)	(0.2)	(0.1)	(0.6)
Exciting	16	11	8	35
% within Place	(4.0)	(2.8)	(2.0)	
% of Total	(1.3)	(0.9)	(0.7)	(2.9)
Pleasant	84	78	68	230
% within Place	(21.0)	(19.5)	(17.0)	
% of Total	(7.0)	(6.5)	(5.7)	(19.2)
Relaxing	8	8	2	15
% within Place	(2.0)	(1.3)	(0.5)	
% of Total	(0.7)	(0.4)	(0.2)	(1.3)
Sleepy	0	0	1	1
% within Place	(0.0)	(0.0)	(0.3)	
% of Total	(0.0)	(0.0))	(0.1)	(0.1)
Gloomy	0	0	0	0
% within Place	(0.0)	(0.0)	(0.0)	
% of Total	(0.0)	(0.0)	(0.0)	(0.0)
Unpleasant	0	0	0	0
% within Place	(0.0)	(0.0)	(0.0)	

% of Total	(0.0)	(0.0)	(0.0))	(0.0)
Distressing	0	0	0	0
% within Place	(0.0)	(0.0)	(0.0)	
% of Total	(0.0)	(0.0)	(0.0)	(0.0)

As shown in Figure 4.3.1, emotional hashtags of images shared at the urban squares express positive emotions with only one exception. The overwhelming majority of these express pleasantness, although hashtags in Union Square express a wider variety of positive qualities, such as *exciting* and *relaxing*.

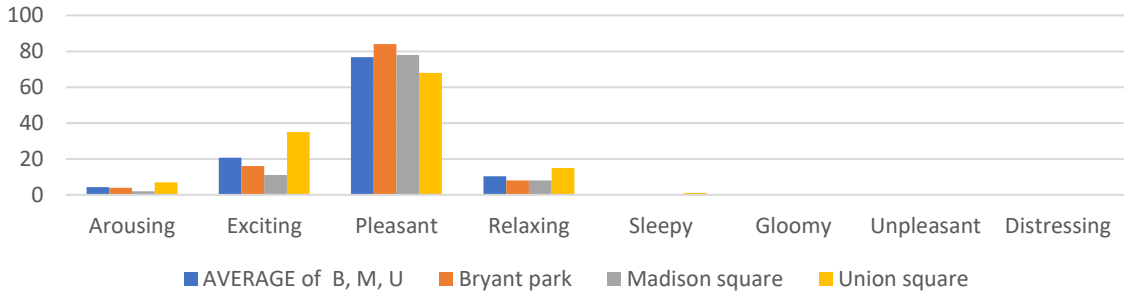

Figure 4.3.1 Distribution of *affective quality* by place.

In terms of *sentiment*, 77% of the sample (n=935) contained no emotional hashtags and were thus classified as *neutral*, followed by *positive* (n=264) and *negative* (n=1) at 22% and 0.1% respectively, as shown in Table 4.3.2 and Figure 4.3.2.

Table 4.3.2 Distribution of sentiment by place

Sentiment	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
Positive	99	89	76	264
% within Place	(24.8)	(22.3)	(19.0)	
% of Total	(8.3)	(7.4)	(6.3)	(22.0)
Neutral	301	310	324	935
% within Place	(75.3)	(77.5)	(81.0)	
% of Total	(25.1)	(25.8)	(27.0)	(77.9)
Negative	0	0	0	1
% within Place	(0.0)	(0.0)	(0.3)	
% of Total	(0.0)	(0.0)	(0.1)	(0.1)

As mentioned above, image content that reflects people's experience at the squares makes little use of hashtags to express emotions in comparison to the three highest-scored

hashtag types, *content-relatedness*, *documentiveness*, and *city-relatedness*. Those emotional hashtags that can be found show almost entirely positive reactions.

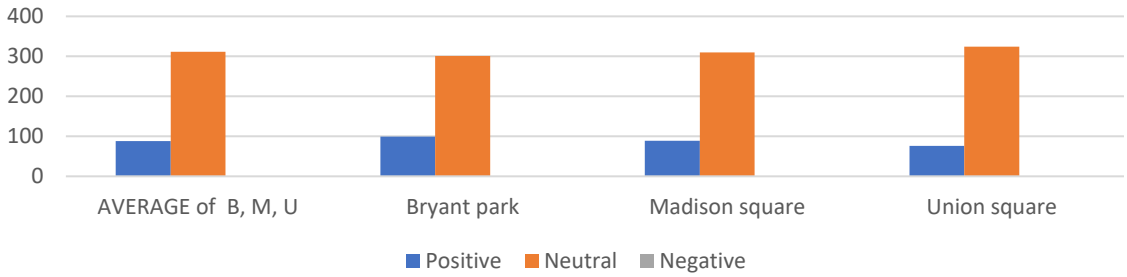

Figure 4.3.2 Distribution of sentiment by place.

In order to better understand how affective qualities of place and sentiment differ in the set of categories and subcategories for each type of photo, a set of chi-square tests were conducted on the sample using eight affective qualities defined in the literature and three levels of sentiment. The two categorical variables were photo category with three types, 1) *physical setting*, 2) *activity*, and 3) *portrait*, and eight affective qualities of place. As shown in Table 4.3.3, the relationship between photo category and *exciting* was significant, $\chi^2(2, N=1200) = 6.166$, $p < .05$, Cramér's $V = .07$. The findings revealed no significant associations between photo category and *arousing*, *pleasant*, *relaxing*, or *sleepy*. Also, none of the 1,200 sample posts contained any of the following three affective qualities: *gloomy*, *unpleasant*, or *distressing*.

Table 4.3.3 Chi-square tests for a collective sense of place on Instagram:
Affective quality of place by photo category

Affective Quality of Place	**Photo Category**			
	Physical Setting	Activity	Portrait	Chi-Square Test
Arousing % within Photo % of Total	5 (0.8) (0.4)	0 (0.0) (0.0)	2 (0.9) (0.2)	$\chi^2(2)=3.070$ p =.215 φ = .051 n =1200
Exciting % within Photo % of Total	15 (2.4) (1.3)	8 (2.2) (0.7)	12 (5.5) (1.0)	$\chi^2(2)=6.166$ p <.05 φ = .072 n =1200

Pleasant % within Photo % of Total	118 (19.1) (9.8)	64 (17.7) (5.3)	48 (21.8) (4.0)	$\chi^2(2)=1.517$ p = .468 φ = .036 n =1200
Relaxing % within Photo % of Total	10 (1.6) (0.8)	1 (0.3) (0.1)	4 (1.8) (0.3)	$\chi^2(2)=4.035$ p =.133 φ = .058 n =1200
Sleepy % within Photo % of Total	1 (0.2) (0.1)	0 (0.0) (0.0)	0 (0.0) (0.0)	$\chi^2(2)= .943$ p =.624 φ = .028 n =1200
Gloomy % within Photo % of Total	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Unpleasant % within Photo % of Total	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Distressing % within Photo % of Total	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-

Note: *p<.05, **p<.01, ***p<.001

As seen in Figure 4.3.3, among the photographs with emotive hashtag, the images of the physical environment of the square are most likely to carry hashtags that express the user's feelings, nearly all of which are positive or neutral. Among the eight affective qualities, the only emotion to show a significant relationship with the overall photo category was *excitement*.

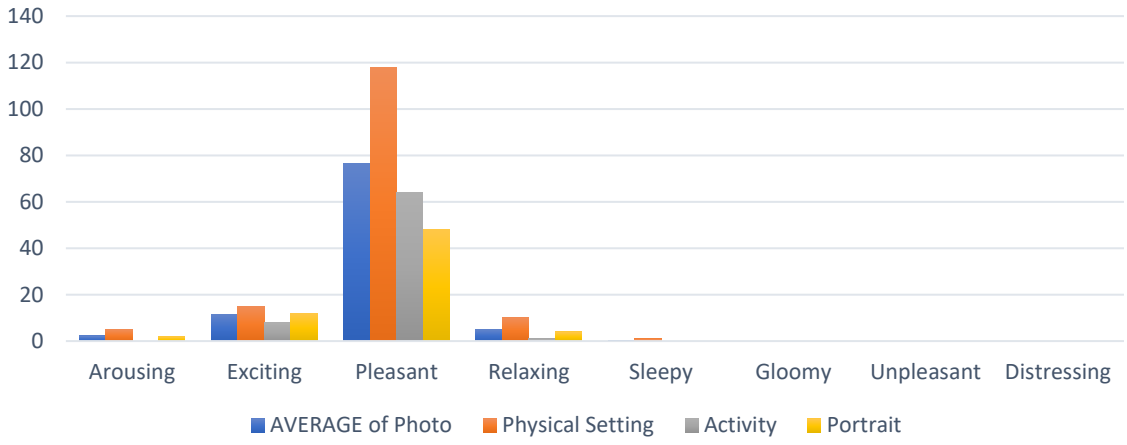

Figure 4.3.3 Distribution of affective qualities by photo.

A chi-square test of independence was performed to examine the relationship between photo category and *sentiment*. The two categorical variables were photo category with three types and sentiment with three levels, 1) *negative*, 2) *neutral*, and 3) *positive*. There was no significant association between photo category and sentiment, $\chi^2(4, N = 1200) = 4.591$, $p = .332$, Cramér's $V = .04$.

Table 4.3.4 A Chi-square test for a collective sense of place on Instagram: Photo category by sentiment

Sentiment	**Photo Category**			χ^2
	Physical Setting	Activity	Portrait	
Sentiment				
Negative	1	0	0	
% within Photo	(0.2)	(0.0)	(0.0)	
% of Total	(0.1)	(0.0)	(0.0)	
Neutral	482	291	167	4.591
% within Place	(78.0)	(80.4)	(73.6)	
% of Total	(40.2)	(24.3)	(13.5)	
Positive	132	72	58	
% within Place	(21.8)	(19.6)	(26.4)	
% of Total	(11.3)	(5.9)	(4.8)	

Hashtags that express people's emotions at the square show no significant relationship between the three levels of sentiment and the photo category, *physical setting*, *activity* or *portrait*.

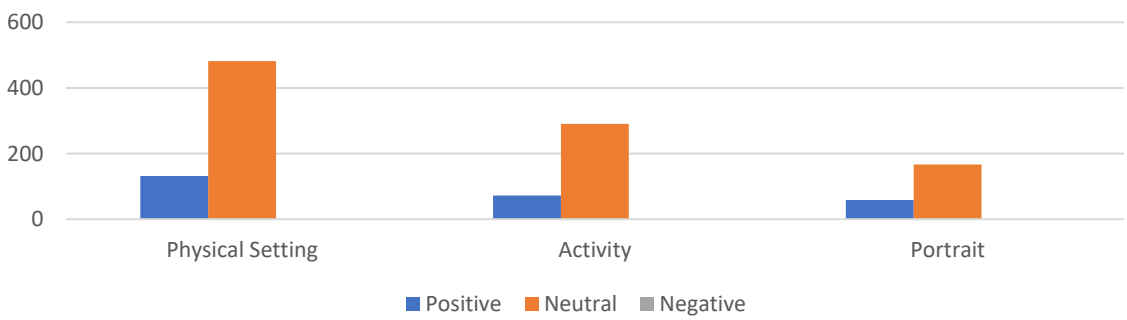

Figure 4.3.4 Distribution of *sentiment* by photo category.

Associations between categories of photograph, *physical setting*, *activity*, and *portrait*, and the two sets of emotional hashtag categories were further examined to better understand these relationships. Chi-square tests of independence were performed to examine the relationship between *physical setting* and the eight affective qualities of place. As shown in Table 4.3.5, the relationship between photo category and *sleepy* was significant, $\chi^2(7, N=1200) = 23.509$, $p < .01$, Cramér's $V = .14$. The findings revealed no significant associations between subcategories of *physical setting* and *arousing*, *exciting*, *pleasant*, or *relaxing*. Also, none of the images categorized as *physical setting* contained hashtags indicating the following three affective qualities: *gloomy*, *unpleasant*, or *distressing*.

Table 4.3.5 A chi-square test for a collective sense of place on Instagram: Photo category by affective quality of place

Affective Quality of Place	**Physical Setting**							χ^2
	Weather	Arts	Architecture	History	Inside	Surroundings	Bird's-eye view	
Arousing **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	1 (2.0) (0.1)	0 (0.0) (0.0)	2 (0.7) (0.2)	2 (1.1) (0.2)	0 (0.0) (0.0)	$\chi^2(7)= 3.957$ p =.785 φ = .028 n =1200
Exciting **% within P_S1** **% of Total**	0 (0.0) (0.0)	2 (4.2) (0.2)	0 (0.0) (0.0)	0 (0.0) (0.0)	7 (2.5) (0.6)	6 (3.3) (0.5)	0 (0.0) (0.0)	$\chi^2(7)= 4.454$ p =.624 φ = .061 n =1200
Pleasant **% within P_S1** **% of Total**	5 (20.0) (0.4)	7 (14.6) (0.6)	8 (16.3) (0.7)	1 (16.7) (0.1)	62 (22.3) (5.2)	30 (16.6) (2.5)	5 (15.6) (0.4)	$\chi^2(7)= 3.754$ p =.808 φ = .056 n =1200
Relaxing **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	$\chi^2(7)= 4.538$ p =.716 φ = .028 n =1200
Sleepy **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	1 (2.0) (0.1)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	$\chi^2(7)= 23.509$ p <.01 φ = .14 n =1200
Negative **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	(0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Negative **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-

Negative **% within P_S1** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	(0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-

Similarly to photo category discussed above, which showed a significant relationship to only one category of affective quality, *exciting*, it was difficult to find any associations between photographs of *physical setting* in urban squares and affective qualities, except for *sleepiness* with one post. As was seen earlier with photo categories, photos showing the physical aspects of each square carry mostly positive hashtags, many of which describe pleasantness.

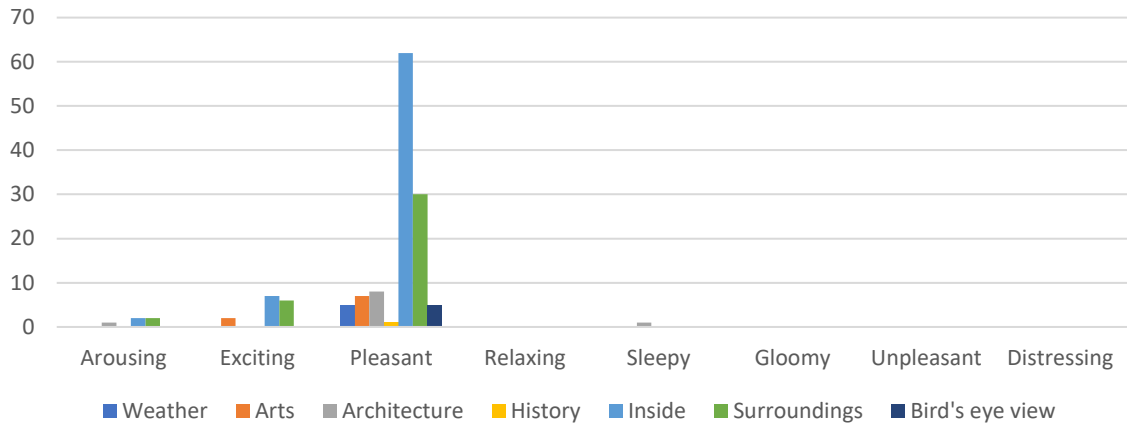

Figure 4.3.5 Distribution of subcategory of *physical setting* by affective quality of place.

A chi-square test of independence was performed to examine the relationship between the *physical setting* category and sentiment. The two categorical variables were *physical setting* with seven types and sentiment with three levels. The relationship between these variables was significant, $\chi^2(14, N = 1200) = 25.262$, $p < .05$, Cramér's $V = .032$. The photos of *weather* (24%, n=6) showed a large degree of positive sentiment, followed by those of *inside* (23.7%, n=66), *arts* (20.8%, n=10), *architecture* (20.8%, n=10).

Table 4.3.6 A chi-square test for a collective sense of place on Instagram:
Physical setting subcategory of photograph by sentiment

Hashtag	**Physical Setting Subcategory**

Category	Weather	Arts	Architecture	History	Inside	Surroundings	Bird's eye view	χ^2
Sentiment								
Negative	0	0	1	0	0	0	0	
% within P_S1	(0.0)	(0.0)	(2.0)	(0.0)	(0.0)	(0.0)	(0.0)	
% of Total	(0.0)	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.1)	
Neutral	19	38	38	5	212	144	27	25.262*
% within P_S1	(76.0)	(79.2)	(77.6)	(83.3)	(76.3)	(79.6)	(84.4)	
% of Total	(1.6)	(3.2)	(3.2)	(0.4)	(17.7)	(12.0)	(2.3)	
Positive	6	10	10	1	66	37	5	
% within P_S1	(24.0)	(20.8)	(20.8)	(16.7)	(23.7)	(20.4)	(15.6)	
% of Total	(0.5)	(0.8)	(0.8)	(0.1)	(5.5)	(3.1)	(0.4)	

Note: *p<.05, **p<.01, ***p<.001

Comparing the photo category, *physical setting*, *activity*, or *portrait*, with the three levels of sentiment, no significant relationship was found. As shown in Figure 4.3.6, the majority of the content shows little sentimental information, while the physical environment of the squares, *inside*, and the surrounding views, *surroundings*, appears to include a high number of hashtags that express positive reactions.

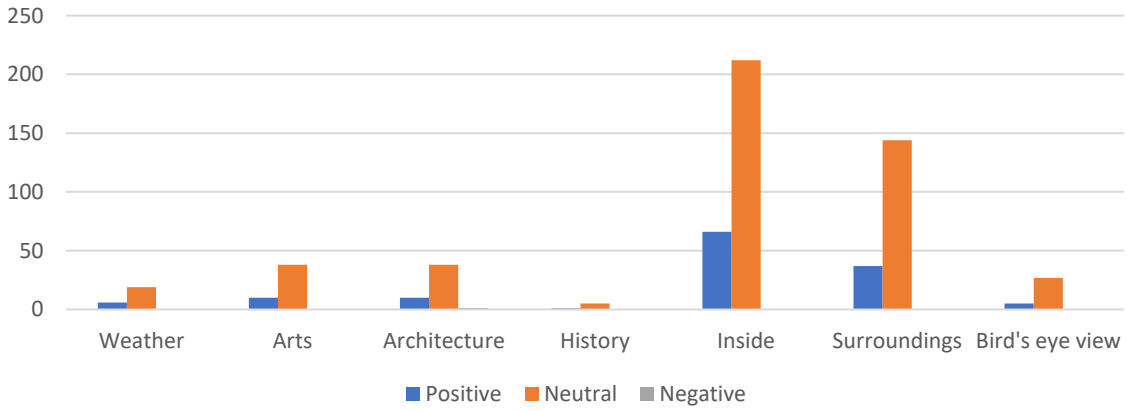

Figure 4.3.6 Distribution of subcategory of *physical setting* by sentiment.

Next, the relationships between user photos of *activity* and the two sets of categories, affective quality of place and levels of sentiment, were examined. Firstly, chi-square tests of independence were performed to examine the relationship between *activity* and eight affective qualities of place. As shown in Table 4.3.7, the relationship between the *activity* category and *pleasant* was significant, $\chi^2(6, N = 1200) = 28.797$, $p < .001$, Cramér's $V = .15$. In addition, the findings revealed no significant associations between the

categories of *activity* and *exciting* or *relaxing*. Also, none of the images categorized as *activity* contained hashtags indicative of the following five affective qualities: *arousing*, *sleepy*, *gloomy*, *unpleasant*, or *distressing*.

Table 4.3.7 Chi-square tests for a collective sense of place on Instagram: Physical setting subcategory of photograph by affective quality of place

Affective Quality of Place	**Activity Subcategory**						χ^2
	Events & cultural activities	Sports & recreational activities	Foods	Local businesses	Local services	Pets	
Arousing **% within P_S2** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Exciting **% within P_S2** **% of Total**	2 (1.2) (0.2)	0 (0.0) (0.0)	3 (4.5) (0.3)	0 (0.0) (0.0)	0 (0.0) (0.0)	3 (8.6) (7.7)	$\chi^2(6)= 8.405$ p =.210 φ = .084 n =1200
Pleasant **% within P_S2** **% of Total**	26 (15.5) (2.2)	8 (21.6) (0.7)	10 (14.9) (0.8)	2 (5.4) (0.2)	0 (0.0) (0.0)	18 (46.2) (1.5)	$\chi^2(6)= 28.797$ p <.001 φ = .15 n =1200
Relaxing **% within P_S2** **% of Total**	0 (0.0) (0.0)	1 (0.6) (0.1)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	$\chi^2(6)= 4.240$ p =.644 φ = .059 n =1200
Sleepy **% within P_S2** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Gloomy **% within P_S2** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	(0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Unpleasant **% within P_S2** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-
Distressing **% within P_S2** **% of Total**	0 (0.0) (0.0)	0 (0.0) (0.0)	(0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	0 (0.0) (0.0)	-

Hashtags expressing *pleasantness* were utilized most in photos capturing cultural programs and activities that occur at the urban squares, followed by photographs of *pets*, *foods*, and *sports & recreational activities*.

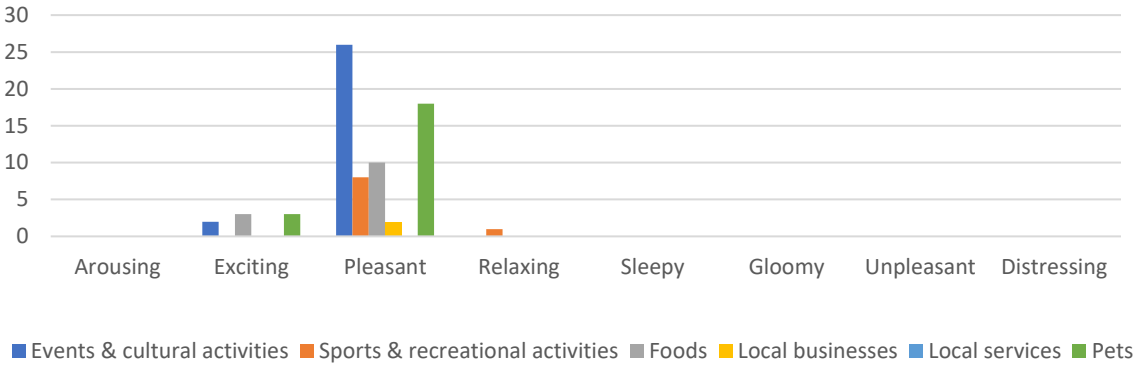

Figure 4.3.7 Distribution of subcategory of *activity* by affective quality of place.

Next, a chi-square test of independence was performed to examine the relationship between the *activity* category and *sentiment*. The two variables were *activity* subcategory with six types and *sentiment* with three levels. The relationship between these variables was significant, $\chi^2(12, N = 1200) = 26.708$, $p < .01$, Cramér's $V = .10$. The same order of the largest number of *positive* hashtags discussed above was revealed in the relationship between *activity* subcategory and *sentiment*.

Table 4.3.8 A chi-square test for a collective sense of place on Instagram: *Activity* subcategory of photograph by sentiment.

Hashtag Category	**Activity Subcategory**						χ^2
	Events & cult	Sports & recreati	Foods	Local busines	Local services	Pets	
Sentiment							
Negative	0	0	0	0	0	0	26.708**
% within P_S2	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	
% of Total	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	
Neutral	139	28	54	35	14	21	
% within P_S2	(82.7)	(75.7)	(80.6)	(94.6)	(100)	(53.8)	
% of Total	(11.6)	(2.3)	(4.5)	(2.9)	(1.2)	(1.8)	
Positive	29	9	13	2	0	18	
% within P_S2	(17.3)	(100)	(19.4)	(5.4)	(0.0)	(46.2)	
% of Total	(2.4)	(3.1)	(1.1)	(0.2)	(0.0)	(1.5)	

Note: *p<.05, **p<.01, ***p<.001

The results show a strong relationship between user photographs of *activity* and the three levels of sentiment, higher numbers of hashtags showing positive sentiment occur in the order of dynamic *events & cultural activities, pets, foods, sports & recreational*

activities. One interesting finding is that for user photos of *pets*, nearly half of the photographs utilized hashtags that expressed a positive reaction.

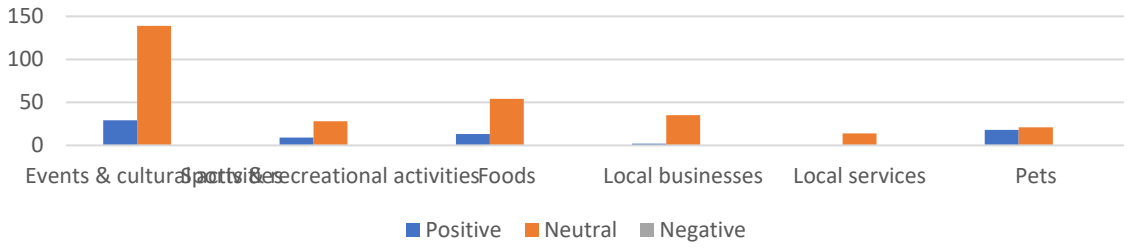

Figure 4.3.8 Distribution of subcategory of *activity* by sentiment.

Lastly, a set of chi-square tests of independence was performed to examine the relationship between *portrait* and the eight affective qualities of place. As shown in Table 4.3.9, the relationship between *portrait* and *exciting* was significant, $\chi^2(2, N = 1200) = 7.271$, $p < .05$, Cramér's $V = .07$. The findings revealed no significant associations between *portrait* and the hashtag categories of *arousing*, *pleasant*, and *relaxing*. Also, none of the images categorized as *portrait* contained hashtags of the following four affective qualities: *sleepy*, *gloomy*, *unpleasant*, or *distressing*.

Table 4.3.9 A chi-square test for a collective sense of place on Instagram: *Portrait* subcategory of photograph by affective quality of place

Affective Quality of Place	**Portrait Subcategory**		χ^2
	Individual	Group	
Arousing % within P_S3 % of Total	1 (0.8) (0.1)	1 (1.0) (0.1)	$\chi^2(2) = .490$ p =.783 φ = .020 n =1200
Exciting % within P_S3 % of Total	5 (4.2) (0.4)	7 (6.8) (0.6)	$\chi^2(2) = 7.271$ p <.05 φ = .078 n =1200
Pleasant % within P_S3 % of Total	27 (22.7) (2.3)	22 (21.4) (1.8)	$\chi^2(2) = 1.547$ p =.461 φ = .036 n =1200
Relaxing % within P_S3 % of Total	3 (2.5) (0.3)	1 (1.0) (0.1)	$\chi^2(2) = 1.747$ p =.418 φ = .038 n =1200
Sleepy % within P_S3	0 (0.0)	0 (0.0)	

% of Total	(0.0)	(0.0)	
Gloomy	0	0	
% within P_S3	(0.0)	(0.0)	-
% of Total	(0.0)	(0.0)	
Unpleasant	0	0	
% within P_S3	(0.0)	(0.0)	-
% of Total	(0.0)	(0.0)	
Distressing	(0	0	
% within P_S2	(0.0)	(0.0)	-
% of Total	(0.0)	(0.0)	

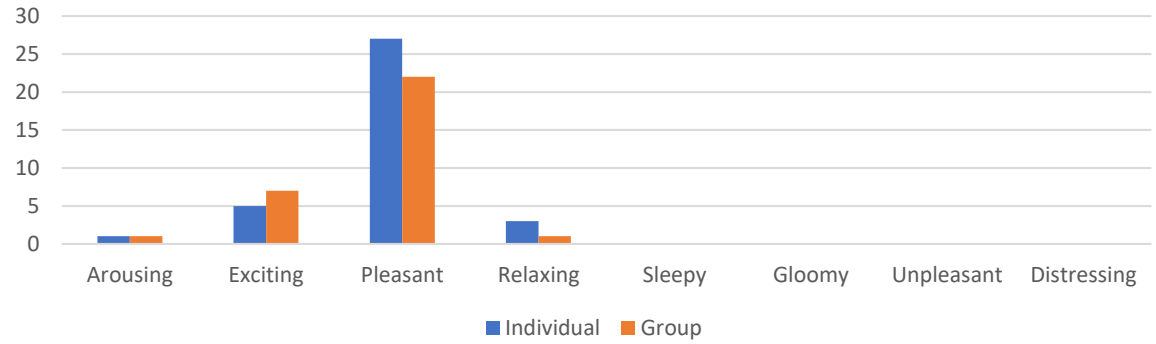

Figure 4.3.9 Distribution of subcategory of *portrait* by affective quality of place.

Among *portrait* photos shared at the squares, portraits of single people contained the larger number of *pleasant* hashtags. On the other hand, *group* photos taken with friends and family included the larger number of *exciting* hashtags.

Lastly, a chi-square test of independence was performed to examine the relationship between the *portrait* category and *sentiment*. The two categorical variables were *portrait* subcategory with two types and sentiment with three levels. As shown in Table 4.3.10, there was no significant association between the *portrait* category and sentiment, $\chi^2(4, N = 1200) = 3.805$, $p = .433$, Cramér's $V = .04$. The *portrait* category was the only photo type to show no significant relationship with *sentiment*, while user images of *physical setting* and *activity* both had strong relations to *sentiment*.

Table 4.3.10 A chi-square test for a collective sense of place on Instagram: Portrait subcategory of photograph by sentiment

	Portrait Subcategory

Hashtag Category	Individual	Group	χ^2
Sentiment			
Negative	0	0	
% within P_S3	(0.0)	(0.0)	
% of Total	(0.0)	(0.0)	
Neutral	89	74	
% within P_S3	(74.8)	(71.8)	3.805
% of Total	(7.4)	(6.2)	
Positive	30	29	
% within P_S3	(25.2)	(28.2)	
% of Total	(2.5)	(2.4)	

Note: *p<.05, **p<.01, ***p<.001

While the *portrait* photos showed a strong relationship with excitement, which is one of the affective qualities, they showed no correlation to any of the three levels of sentiment, *positive*, *neutral*, or *negative*.

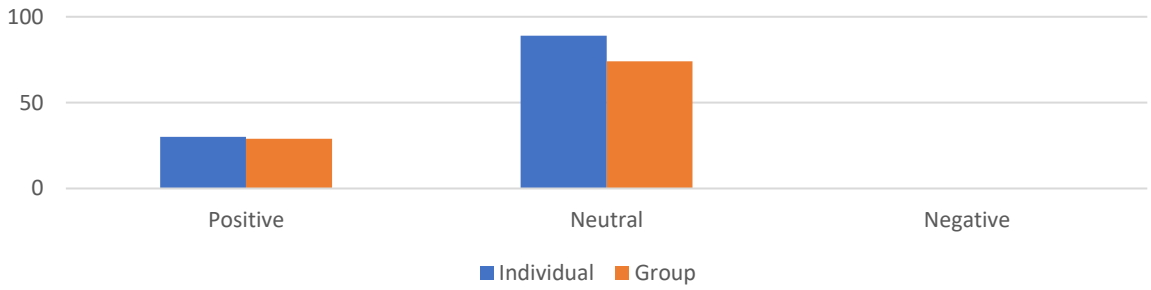

Figure 4.3.10 Distribution of subcategory of *portrait* by sentiment.

4.4 City-Relatedness Hashtags on User-Generated Content

People's perceptions shown through their photo content are interconnected with the urban public spaces and the city itself through hashtags. To facilitate an in-depth understanding of the relationship between the user photos of public space and urban identity, a *city-relatedness* category was developed with three subcategories, 1) *city name*, 2) *other place*, and 3) *compound word*. As mentioned above, one of the most significant findings was that 71.2% (n=854) of the sampled posts were tagged with one or more words related to New York City. Specifically, 60.8% of the sample included hashtags of *city name* (n=729), followed by *other place* (20.8%, n=250) and *compound word* (21.5%, n=258) as indicated in Table 4.4.1. Another interesting finding was that the three study sites presented differences in the patterns of subcategories of *city-relatedness*. For Bryant

Park, *city name* (64.8%, n=259) exhibits a higher number of hashtags than the other places, Madison Square Park (61.8%, n=247) and Union Square (55.8%, n=223). The sample of Madison Square Park showed the largest portion in *other place* (26.3%, n=105), and *compound word* hashtags were observed most from Union Square at 24.3% (n=97), as displayed in Figure 4.4.1.

Table 4.4.1 Distribution of *city-relatedness* hashtags by place

Hashtag Category	**Place**			
	Bryant Park	Madison Square Park	Union Square	**Total**
City-relatedness	294	283	275	852
% within Place	(73.5)	(70.8)	(68.8)	
% of Total	(24.5)	(23.6)	(22.9)	(71.0)
City name	259	247	223	729
% within Place	(64.8)	(61.8)	(55.8)	
% of Total	(21.6)	(20.6)	(18.6)	(60.8)
Other place	72	105	73	250
% within Place	(18.0)	(26.3)	(18.3)	
% of Total	(6.0)	(8.8)	(6.1)	(20.8)
Compound word	90	71	97	258
% within Place	(22.5)	(17.8)	(24.3)	
% of Total	(7.5)	(5.9)	(8.1)	(21.5)

As shown in Figure 4.4.1, images created at all three sites frequently show hashtags related to the name of city, New York City, including #newyork and #nyc. However, usage patterns of city-related hashtags, including urban-scale elements such as major landmarks, architecture and open spaces, and *compound-word* hashtags, which combine the name of the city with other words, appear to vary between the squares.

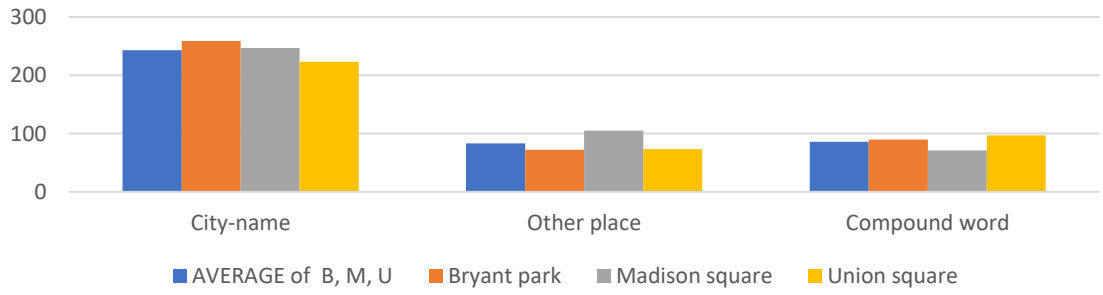

Figure 4.4.1 Distribution of *city-relatedness* hashtags by place.

To further understand the relationship between user-generated content (UGC) in urban public space and urban identity, a set of chi-square tests of independence was performed to examine the relationship between photo category and the *city-relatedness* of the hashtags. The two categorical variables were photo category with three types, 1) *physical setting*, 2) *activity*, and 3) *portrait*, and *city-relatedness* hashtag category with four types, 1) *city-relatedness*, 2) *city name*, 3) *other place*, and 4) *compound word*. Table 4.4.2 reveals a significant association between photo category and all four types of hashtag in the *city-relatedness* category. The results of the chi-square tests between photo category and all four types of hashtag in *city-relatedness* are as follows: $\chi^2(2, N=1200) = 26.486$, $p < .001$, Cramér's $V = .14$. for the relationship between photo category and *city-relatedness*; $\chi^2(2, N=1200) = 26.544$, $p < .001$, Cramér's $V = .14$ for the relationship between photo category and *city name*; $\chi^2(2, N=1200) = 30.876$, $p < .001$, Cramér's $V = .16$ for the relationship between photo category and *other place*; and $\chi^2(2, N=1200) = 6.417$, $p < .05$, Cramér's $V = .07$ for the relationship between photo category and *compound word*. The photos of *physical setting* contained the largest portion of city-relatedness hashtags (77.3%, n=478), followed by those of *portrait* (67.3%, n=148) and *activity* (62.4%, n=226). Specifically, the most popular city-related hashtag, *city name*, was found more in *physical setting* photographs (67.2%) than in *portrait* (59.5%) or *activity* (50.6%) photographs, showing the same order as in the three photograph types above. On the contrary, people's photographs of *activity* shared in the urban squares contained more *other place* and *compound word* hashtags than those of *portrait*; while photos of *physical setting* saw the highest portions of both types of tags (27.0% for *other place* and 23.6% *for compound word*) in comparison to the photos of *activity* (15.7% and 21.5%) and *portrait* (11.8% and 15.5%).

Table 4.4.2 Chi-square tests for a collective sense of place on Instagram: Photo category by hashtag categories of *city-relatedness*

Hashtag Category	**Photo Category**			
	Physical Setting	Activity	Portrait	Chi-Square Test
City-relatedness % within Photo % of Total	478 (77.3) (39.8)	226 (62.4) (15.3)	148 (67.3) (10.9)	$\chi^2(2)=26.483$ p <.001 φ = .14 n =1200
City name % within Photo % of Total	415 (67.2) (34.6)	183 (50.6) (15.3)	131 (59.5) (10.9)	$\chi^2(2)=26.544$ p <.001 φ = .14 n =1200
Other place % within Photo % of Total	167 (27.0) (13.9)	57 (15.7) (4.8)	26 (11.8) (2.2)	$\chi^2(2)=30.876$ p <.001 φ = .16 n =1200
Compound word % within Photo % of Total	146 (23.6) (12.2)	78 (21.5) (6.5)	34 (15.5) (2.8)	$\chi^2(2)=6.417$ p <.05 φ = .07 n =1200

The largest portion of city-related hashtags turned out to belong to the category of *city name*. As displayed in Table 4.4.2, all types of user photographs in the urban squares were highly connected to city-related hashtags. Particularly, imagery reflecting the scenery or physical aspects of the squares contained the largest share of hashtags among the three types of photograph.

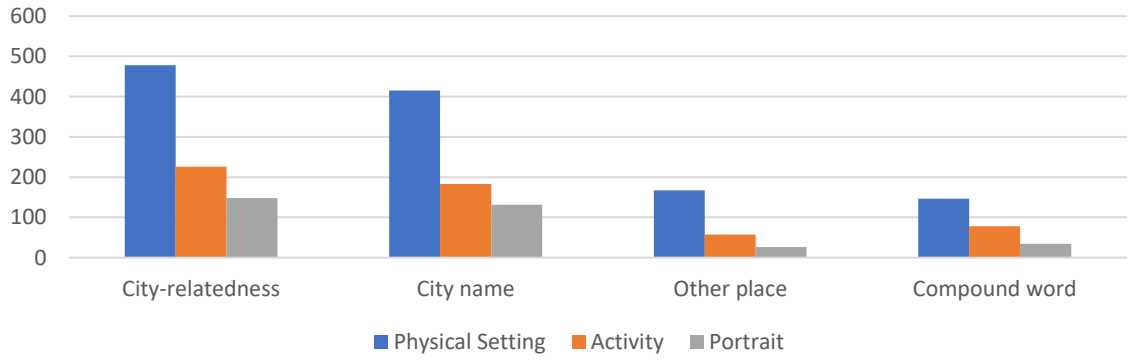

Figure 4.4.2 Distribution of *photo* category by hashtag categories of *city-relatedness.*

In order to examine the relationships between subcategories of each photograph type, *physical setting*, *activity* and *portrait*, and *city-relatedness* hashtag, three sets of chi-square tests were conducted. In terms of users' photos of *physical setting*, the two

variables were *physical setting* subcategory with seven types, 1) *weather*, 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surrounding*, and 7) *bird's-eye view*, and the *city-relatedness* hashtag category with four types. As shown in Table 4.4.3, the results indicated that the relationship between the *physical setting* category and *city-relatedness* was significant, $\chi^2(7, N=1200) = 34.360$, $p < .001$, Cramér's $V = .16$. In terms of the relationships of *physical setting* to subcategories of *city-relatedness*, two types of hashtags, *city name* and *other place*, revealed significant relationships, at $\chi^2(7, N=1200) = 32.474$, $p < .001$, Cramér's $V = .16$ for *city name* and $\chi^2(7, N=1200) = 32.427$, $p < .001$, Cramér's $V = .16$ for *other place.* On the other hand, there was no significant association between the *physical setting* category and *compound word*, $\chi^2(7, N=1200) = 12.857$, $p = .076$, Cramér's $V = .10$. The results revealed that users' photographs of *architecture* contained the largest portion of *city-relatedness* hashtags (89.8%) among the seven subcategories, followed by photos of *history* (83.3%), *surroundings* (80.1%), and *weather* (80.0%). In terms of subcategory of *city-relatedness* hashtag, users' photographs of *architecture* (79.6%), *surroundings* (69.9%), and *bird's-eye view* (68.8%) were the most likely to contain hashtags *city name*. In addition, user photographs of *weather* (36.0%), *architecture* (32.7%), and *bird's-eye view* (28.1%) revealed the largest share of *other place* hashtags.

Table 4.4.3 Chi-square tests for a collective sense of place on Instagram:
Physical setting subcategory of photograph by hashtag categories of *city-relatedness*

Hashtag category	**Physical Setting Subcategory**							
	Weather	Arts	Architecture	History	Inside	Surrounding s	Bird's-eye view	Chi-square test
City-relatedness % within P_S1 % of Total	20 (80.0) (1.7)	30 (62.5) (2.5)	44 (89.8) (3.7)	5 (83.3) (0.4)	209 (75.2) (17.4)	145 (80.1) (12.1)	25 (78.1) (2.1)	χ^2 (7)=34.360 p <.001 φ = .16 n =1200
City name % within P_S1 % of Total	17 (68.0) (1.4)	23 (47.9) (1.9)	39 (79.6) (3.3)	4 (66.7) (0.3)	184 (66.2) (15.3)	126 (69.6) (10.5)	22 (68.8) (1.8)	χ^2 (7)=32.474 p <.001 φ = .16

								n =1200
Other place % within P_S1 % of Total	9 (36.0) (0.8)	13 (27.1) (1.1)	16 (32.7) (1.3)	1 (16.7) (0.1)	70 (25.2) (5.8)	49 (27.1) (4.1)	9 (28.1) (0.8)	χ^2 (7)=32.427 p <.001 φ = .16 n =1200
Compound word % within P_S1 % of Total	8 (32.0) (0.7)	7 (14.6) (0.6)	8 (16.3) (0.7)	3 (50.0) (0.3)	74 (26.6) (6.2)	40 (22.1) (3.3)	6 (18.8) (0.5)	χ^2 (7)=12.857 p =.076 φ = .104 n =1200

As shown in Table 4.4.3, imagery showing the physical attributes and environment of the squares carry the strongest association with hashtags of *city-relatedness*, *city name* and *other place*. After these come photographs of the surrounding physical context of the urban square including adjacent architecture, streetscape and bird's-eye views. Through this, it is recognized that users' experiences of the square as well as the surrounding views are recognized as part of the cityscape and are widely shared as UGC through the visual social media platform.

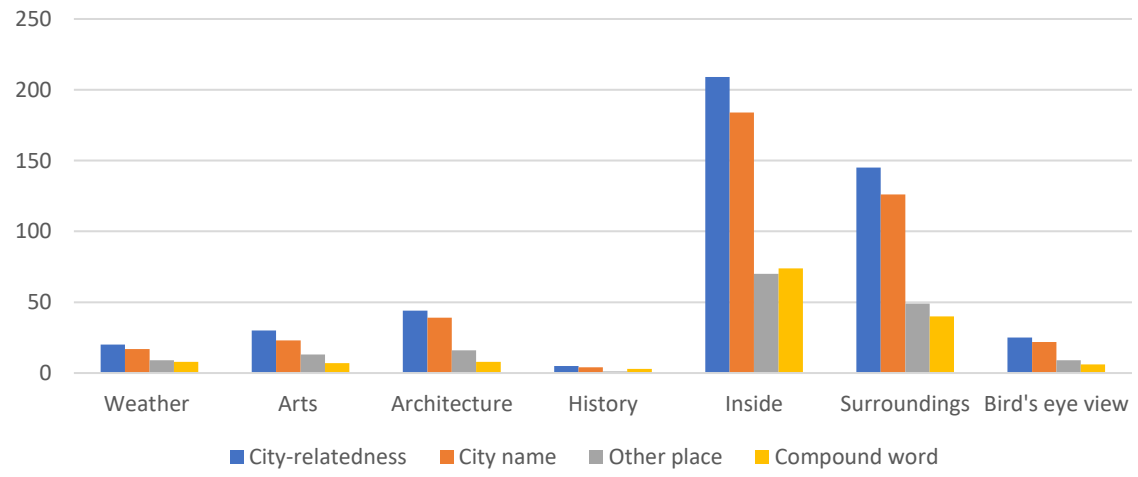

Figure 4.4.3 Distribution of subcategory of physical setting by hashtag categories of *city-relatedness.*

Next, a set of chi-square tests of independence was performed to examine the relationship between the category and the *city-relatedness* hashtag category. The two variables were *activity* subcategory with six types, 1) *events & cultural activities*, 2) *sports & recreational activities*, 3) *foods*, 4) *local businesses*, 5) *local services*, and 6) *pets*, and the *city-relatedness* hashtag category with four types. As displayed in Table 4.4.4, the results similar relationships to those observed in the chi-square tests of *photo* types and

city-relatedness hashtags above*; city-relatedness* and its two types, *city name* and *other place,* indicated significant relationships. The relationship between the *activity* category and *city-relatedness* was significant, $\chi^2(6, N=1200) = 32.182$, $p < .001$, Cramér's $V = .16$. In addition, the relationships of the *activity* category to *city name* and *other place* were significant, $\chi^2(6, N=1200) = 33.376$, $p < .001$, Cramér's $V = .16$, and $\chi^2(6, N=1200) = 14.558$, $p < .05$, Cramér's $V = .11$ respectively. On the other hand, there was no significant association between the *activity* category and *compound word*, $\chi^2(6, N=1200) = 4.177$, $p = .653$, Cramér's $V = .05$. 78.4% of user photographs of *local businesses* contained *city-relatedness* hashtags, followed by *sports & recreational activities* (73.0%) and *foods* (73.0%). Specifically, people added hashtags of *city name* to 64.9% of photos of *sports & recreational activities,* 64.3% of *local services* photos, and 64.3% of photos of *local businesses*. Similarly, user photos of *local services* (28.6%) and *sports & recreational activities* (24.3%) contained the highest portions of *other place* hashtags, followed by those of *foods* (19.4%). In turn, *sports & recreational activities* were the most likely of the six subcategories of *activity* to contain *city-relatedness* hashtags.

Table 4.4.4 Chi-square tests for a collective sense of place on Instagram:
Activity subcategory of photograph by hashtag categories of *city-relatedness*

Hashtag Category	**Activity Subcategory**						
	Events & cultural activities	Sports & recreational activities	Foods	Local businesses	Local services	Pets	Chi-square test
City-relatedness % within P_S2 % of Total	96 (57.1) (8.0)	27 (73.0) (2.3)	46 (68.7) (3.8)	29 (78.4) (2.4)	9 (64.3) (0.8)	19 (48.7) (1.6)	$\chi^2(6)=32.182$ p <.001 φ = .16 n =1200
City name % within P_S2 % of Total	79 (47.0) (6.6)	24 (64.9) (2.0)	34 (50.7) (2.8)	23 (62.2) (1.9)	9 (64.3) (0.8)	14 (35.9) (1.2)	$\chi^2(6)=33.376$ p <.001 φ = .16 n =1200
Other place % within P_S2 % of Total	21 (12.5) (1.8)	9 (24.3) (0.8)	13 (19.4) (1.1)	7 (18.9) (0.6)	4 (28.6) (0.3)	3 (7.7) (0.3)	$\chi^2(6)=14.558$ p <.05 φ = .11

							n =1200
Compound word % within P_S2 % of Total	32 (19.0) (2.7)	6 (16.2) (0.5)	20 (29.9) (1.7)	9 (24.3) (0.8)	3 (21.4) (0.3)	8 (20.5) (0.7)	$\chi^2(6)=4.177$ p =.653 φ = .059 n =1200

In terms of users' photographs of *activity*, *city name* and *other place* hashtags both show significant relationships to the *activity* images in the squares. Particularly, the number of photographs of cultural programs, such as music concerts in Bryant Park or Greenmarket in Union Square, were much larger than that of *sports & recreational activities* such as yoga, juggling or skating. As seen in Figure 4.4.4, *foods* and *local businesses* were the other categories of imagery that contained a larger number of city-related tags after the two categories mentioned above.

Figure 4.4.4 Distribution of subcategory of *activity* by hashtag categories of *city-relatedness.*

Lastly, a set of chi-square tests of independence was performed to examine the relationship between *portrait* subcategory and the *city-relatedness* hashtag category. The two variables were *portrait* subcategory with two types, 1) *individual*, and 2) *group*, and the *city-relatedness* hashtag category with four types. As displayed in Table 4.4.5, there were no significant associations between *portrait* subcategory and *city-relatedness*, $\chi^2(2, N=1200) = 2.523$, $p=.283$, Cramér's $V=.04$, and between *portrait* subcategory and the *city name* category, $\chi^2(2, N=1200) = 1.431$, $p=.489$, Cramér's $V=.35$. On the other hand, the relationship between *portrait* subcategory and the *other place* category was

significant, $\chi^2(2, N=1200) = 13.742$, $p < .001$, Cramér's $V = .10$. Also, the relationship between *portrait* subcategory and *compound word* was significant, $\chi^2(2, N=1200) = 6.179$, $p < .05$, Cramér's $V = .07$. Although both users' portrait photographs showed significant relationships to both *other place* and *compound word* hashtags, no great differences were observed in the proportion of the two image types, *individual* and *group*.

Table 4.4.5 Chi-square tests for a collective sense of place on Instagram:
Portrait subcategory of photograph by hashtag categories of *city-relatedness*

Hashtag Category	**Portrait Subcategory**		
	Individual	Group	Chi-square test
City-relatedness % within P_S3 % of Total	80 (67.2) (6.7)	68 (66.0) (5.7)	$\chi^2(2)=2.523$ p =.283 φ = .046 n =1200
City name % within P_S3 % of Total	74 (62.2) (6.2)	57 (55.3) (4.8)	$\chi^2(2)=1.431$ p =.489 φ = .35 n =1200
Other place % within P_S3 % of Total	14 (11.8) (1.2)	12 (11.7) (1.0)	$\chi^2(2)=13.742$ p <.001 φ = .10 n =1200
Compound word % within P_S3 % of Total	18 (15.1) (1.5)	16 (15.5) (1.3)	$\chi^2(2)=6.179$ p <.05 φ = .07 n =1200

As a note, the previous two categories, *physical setting* and *activity*, showed significant relationships with hashtags of *city-relatedness* and *city-name*, but this was not the case for *portrait*. On the contrary, *other place* and *compound word* did show a close relationship; in fact, the *portrait* category is the only type of photograph that showed a close relation to the hashtag of *compound word* shared by users at the squares.

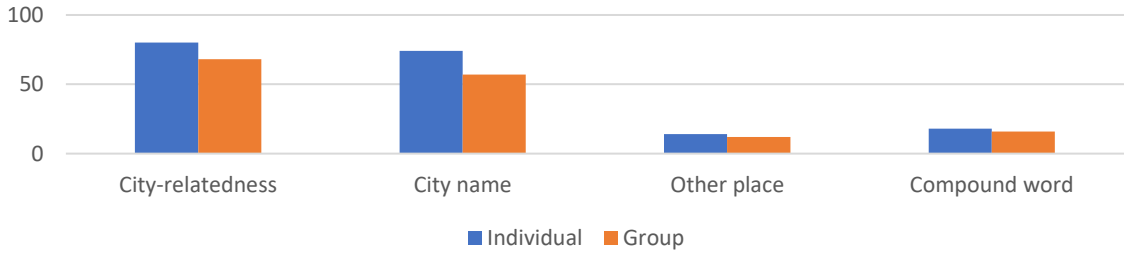

Figure 4.4.5 Distribution of subcategory of *portrait* by hashtag categories of *city-relatedness.*

4.5 Distinctive Pattern of User-Generated Content by Urban Public Space

In addition to the descriptive analysis in section 4.1, a set of chi-square tests were conducted with user photographs and hashtags to further understand the distinctiveness of UGC across the research sites. Firstly, a chi-square test of independence was performed to examine the relationship between *place* and *photo* category. The two variables were *place* with three locations, 1) Bryant Park, 2) Madison Square Park, and 3) Union Square Park, and photo category with three types, 1) *physical setting*, 2) *activity*, and 3) *portrait*. The relationship between these variables was significant, $\chi^2(4, N=1200) = 52.657$, $p < .001$, Cramér's $V = .14$. Interestingly, all three urban square scored highest on the overall photo category. As shown in Table 4.5.1, people shared more photos of *physical setting* (62.5%, n=250) in Madison Square Park than in the other two research sites, Bryant Park (49.0%, n=196) or Union Square (43.0%, n=172); photos of *activity* were seen most in Union Square (41.5%, n=166), almost double the amount in Madison Square (21.8%, n=87). Lastly, people shared *portraits* most in Bryant Park (23.8%, n=95) than in Madison Square (15.8%, n=63) or Union Square (15.5%, n=62).

Table 4.5.1 A chi-square test for a collective sense of place on Instagram: Place by photo category

Photo Category	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Physical setting	196	250	172	
% within Place	(49.0)	(62.5)	(43.0)	
% of Total	(16.3)	(20.8)	(14.3)	
Activity	109	87	166	
% within Place	(27.3)	(21.8)	(41.5)	
% of Total	(9.1)	(7.2)	(13.8)	52.657***
Portrait	95	63	62	
% within Place	(23.8)	(15.8)	(15.5)	
% of Total	(7.9)	(5.3)	(5.2)	
Total	400	400	400	

% within Place % of Total	(100) (33.3)	(100) (33.3)	(100) (33.3)

Note: *p<.05, **p<.01, ***p<.001

As shown in Figure 4.5.1, the type of imagery appears to vary significantly between sites. The order of number of photographs of physical elements, activities and portraits remains consistent throughout the three sites, but as mentioned previously, the three sites showed a unique pattern in the types of images that were shared. Users shared more *portraits* at Bryant Park than at the other sites, while physical elements and surroundings were key for Madison Square Park. At Union Square, people shared the largest number of photos of programs that were being held at the square.

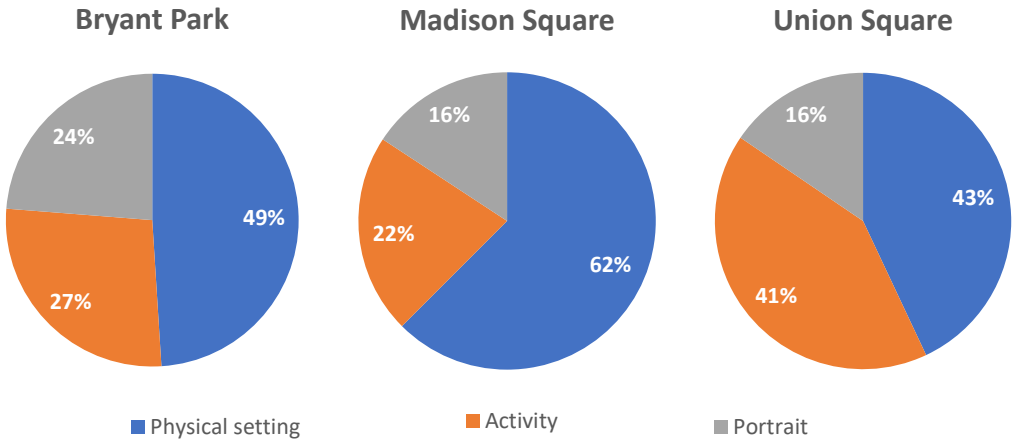

Figure 4.5.1 Distribution of photo category by place.

Consequently, the relationships between subcategory of user photograph and urban public space were examined. To begin with, chi-square tests of independence were performed to examine the relationship between *place* and *physical setting* subcategory. The two categorical variables were *place* with three locations and *physical setting* subcategory with seven types, 1) *weather*, 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surroundings*, and 7) *bird's-eye view*. As displayed in Table 4.4.2, the relationship between *place* and *physical setting* was significant, $\chi^2(14, N=1200) = 100.574$, $p < .001$, Cramér's $V = .20$. Large differences among the research sites can be observed in relation to

the amount of user content for each subcategory. For instance, user photographs of *inside* counted higher in Bryant Park (29.3%, n=117) and Madison Square Park (28.7%, n=115) than in Union Square (11.5%, n=46). In contrast, people published more photos of *architecture* and *bird's-eye view* in Union Square, 14.8% (n=59) and 2.8% (n=22) respectively, than in the other research sites: 3.3% (n=13) and 0.3% (n=4) for Bryant Park and 6.5% (n=26) and 0.5% (n=6) for Madison Square Park. In Madison Square Park, people shared more photos of *surroundings* (19.5%, n=78) than in Union Square (14.8%, n=59) or Bryant Park (11.0%, n=44).

Table 4.5.2 A chi-square test for a collective sense of place on Instagram: Place by *physical setting* subcategory of photograph

Physical Setting	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Weather	8	7	10	100.574***
% within Place	(2.0)	(1.8)	(2.5)	
% of Total	(0.7)	(0.6)	(0.8)	
Arts	9	18	21	
% within Place	(2.3)	(4.5)	(5.3)	
% of Total	(0.5)	(1.8)	(2.5)	
Architecture	13	26	10	
% within Place	(3.3)	(6.5)	(2.5)	
% of Total	(1.1)	(2.2)	(0.8)	
History	1	0	5	
% within Place	(0.3)	(0.0)	(1.3)	
% of Total	(0.1)	(0.0)	(0.4)	
Inside	117	115	46	
% within Place	(29.3)	(28.7)	(11.5)	
% of Total	(9.8)	(9.6)	(3.8)	
Surroundings	44	78	59	
% within Place	(11.0)	(19.5)	(14.8)	
% of Total	(3.7)	(6.5)	(4.9)	
Bird's-Eye View	4	6	22	
% within Place	(0.3)	(0.5)	(1.8)	
% of Total	(1.0)	(1.5)	(5.5)	
Does not belong to category	204	150	227	
% within Place	(51.0)	(37.5)	(56.8)	
% of Total	(17.0)	(12.5)	(18.9)	
Total	400	400	400	
% within Place	(100)	(100)	(100)	

% of Total	(33.3)	(33.3)	(33.3)

Note: *p<.05, **p<.01, ***p<.001

As indicated in Figure 4.5.2, the captured perceptions of physical attributes are shown differently at each of the three squares. Users at Bryant Park mostly shared the natural and built environment, the photographs of *inside*, within the park, while Madison Square Park was widely posted with overall views of the park and the cityscape with its surrounding architecture. Union Square had a large portion of *bird's-eye view* photographs that were taken from adjacent buildings as well as images of the surrounding cityscape that were taken from inside the square.

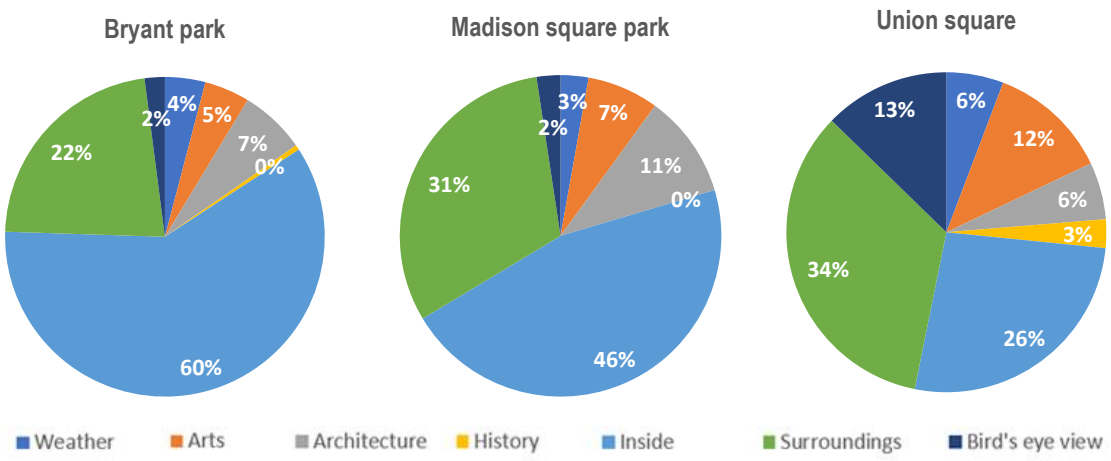

Figure 4.5.2 Distribution of subcategory of *physical setting* by place.

Next, a chi-square test of independence was performed to examine the relationship between *place* and *activity* subcategory. The two categorical variables were *place* with three locations and *activity* subcategory with six types, 1) *events & cultural activities*, 2) *sports & recreational activities*, 3) *foods*, 4) *local businesses*, 5) *local services*, and 6) *pets*. The relationship between *place* and *activity* was significant, $\chi^2(12, N=1200) = 143.541$, $p < .001$, Cramér's $V = .24$. As shown in Table 4.5.3, larger differences among the research sites were observed in the subcategory of *activity* than that of subcategory. For

instance, photos of *events & cultural activities* made up 26.5% (n=106) of the content shared in Union Square, while they accounted for only 8.3% (n=33) and 7.2% (n=29) of the user photos shared in Bryant Park and Madison Square Park respectively. Similarly, Union Square elicited a larger portion of user photographs of *local businesses* (4.5%, n=18) than either Madison Square Park (3.0%, n=12) or Bryant Park (1.8%, n=7). In the category of *sports & recreational activities*, Bryant Park contained the highest proportion (7.2%, n=29) of user photographs, with Madison Square Park having only 1.3% (n=5) and Union Square only 0.8% (n=3). For user photographs of *pets*, Madison Square Park (6.3%, n=25) showed a larger number than Union Square (2.0%, n=8) or Bryant Park (2.0%, n=6).

Table 4.5.3 A chi-square test for a collective sense of place on Instagram: Place by *activity* subcategory of photograph

Activity	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Events & cultural activities	33	29	106	143.541***
% within Place	(8.3)	(7.2)	(26.5)	
% of Total	(2.8)	(2.4)	(8.8)	
Sports & recreational activities	29	5	3	
% within Place	(7.2)	(1.3)	(0.8)	
% of Total	(2.4)	(0.4)	(0.3)	
Foods	26	15	26	
% within Place	(6.5)	(3.8)	(6.5)	
% of Total	(2.2)	(1.3)	(2.2)	
Local businesses	7	12	18	
% within Place	(1.8)	(3.0)	(4.5)	
% of Total	(0.6)	(1.0)	(1.5)	
Local services	8	1	5	
% within Place	(2.0)	(0.3)	(1.3)	
% of Total	(0.7)	(0.1)	(0.4)	
Pets	6	25	8	
% within Place	(1.5)	(6.3)	(2.0)	
% of Total	(0.5)	(2.1)	(0.7)	
Does not belong to category	291	313	234	
% within Place	(72.8)	(78.3)	(58.5)	
% of Total	(24.3)	(26.1)	(19.5)	
Total	400	400	400	

% within Place % of Total	(100) (33.3)	(100) (33.3)	(100) (33.3)

Note: *p<.05, **p<.01, ***p<.001

Photos related to dynamic activities also showed major differences between the three sites. For Bryant Park, photos reflecting food or cultural or recreational activities were distributed quite evenly. In Madison Square Park, however, photos of *pets* and regional shops played a much greater role in user content on Instagram. In Union Square, meanwhile, photos of *events and cultural activities* represented nearly two-thirds of the content, a radically high number compared to the other squares.

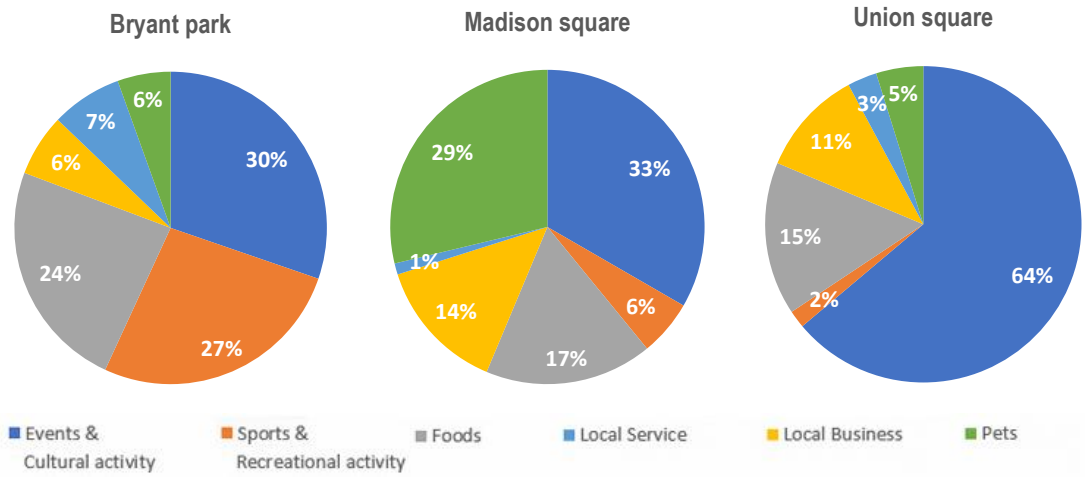

Figure 4.5.3 Distribution of subcategory of *activity* by place.

For the last photo category, *portrait*, a chi-square test of independence was performed to examine the relationship to *place*. The two categorical variables were place and *portrait* subcategory with two types, 1) *individual*, and 2) *group*. The relationship between *place* and *portrait* subcategory was significant, $\chi^2(4, N = 1200) = 11.679$, $p < .05$, Cramér's $V = .07$, while all photo categories, *physical setting*, *activity*, and *portrait*, revealed significant relationships to the variable *place*. In both types of *portrait* photo, people shared the most photographs in Bryant Park, as seen in Table 4.5.4. 12.0% (n=48) of the sampled posts collected from Bryant Park were *individual* portraits, while somewhat fewer were found in Union Square (9.0%, n=36) and Madison Square Park

(8.8%, n=35). Notable differences were also observed in the case of *group* portraits: again, Bryant Park was featured in the most (11.8%, n=47), while the category only accounted for 7.0% (n=28) of photos in both Union Square and Madison Square Park.

Table 4.5.4 A Chi-square test for a collective sense of place on Instagram: Place by *portrait* subcategory of photograph

Portrait Subcategory	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Individual	48	35	36	
% within Place	(12.0)	(8.8)	(9.0)	
% of Total	(4.0)	(2.9)	(3.0)	
Group	47	28	28	
% within Place	(11.8)	(7.0)	(7.0)	
% of Total	(3.9)	(2.3)	(2.3)	11.679*
Does not belong to category	305	337	336	
% within Place	(76.3)	(84.3)	(84.0)	
% of Total	(25.4)	(28.1)	(28.0)	
Total	400	400	400	
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	

Note: *p<.05, **p<.01, ***p<.001

Among the three photo categories, *physical setting*, *activity*, and *portrait*, *portrait* showed the least variation across the three sites. Single-person photos were posted more than group portraits at all sites, although this was most apparent at Union Square.

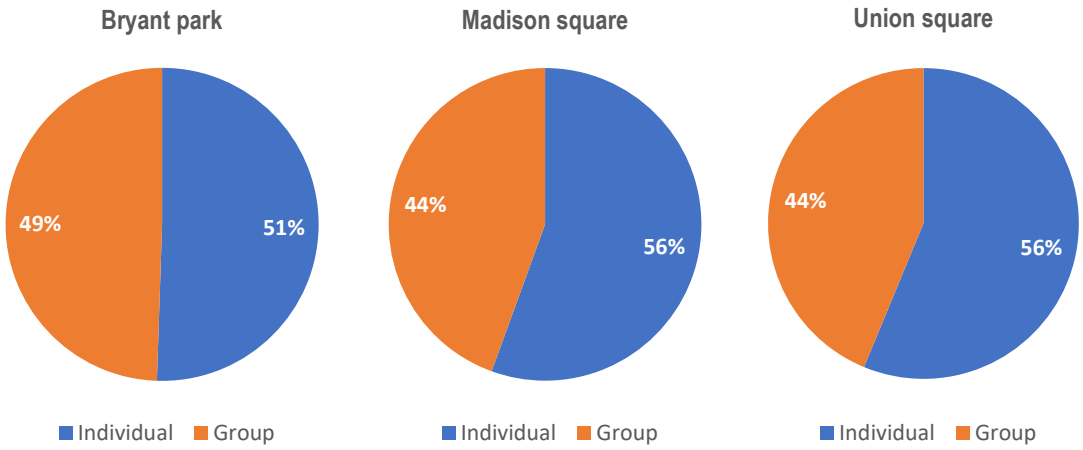

Figure 4.5.4 Distribution of subcategory of *portrait* by place.

To further understand the distinct patterns for each research site, user hashtags were analyzed through a set of chi-square tests in relation to each urban square. The two categorical variables were *place* with three locations and hashtag category with eight types, 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness*, 5) *city-relatedness*, 6) *city name*, 7) *other place*, and 8) *compound word*. As shown in Table 4.4.5, the results of the chi-square tests revealed significant associations between *place* and the hashtag variables of *content-relatedness*, at $\chi^2(2, N=1200) = 10.778$, $p < .01$, Cramér's $V = .09$.; *city name*, at $\chi^2(2, N=1200) = 7.046$, $p < .05$, Cramér's $V = .07$; and *other place*, at $\chi^2(2, N=1200) = 10.681$, $p < .01$, Cramér's $V = .09$. Specifically, 76.3% of user photographs in Union Square (n=305) contained content-related hashtags, followed by Madison Square Park (71.5%, n=286) and Bryant Park (65.8%, n=263). As discussed earlier, people tend to add hashtags of the *city name* category most on their photographs in Bryant Park (74.8%, n=259), although these hashtags were also observed in considerable numbers of user photos shared in Madison Square Park (61.8%, n=247) and Union Square (55.8%, n=223). In terms of the hashtags of the *other place* category, the largest portion was observed in Madison Square Park (26.3%, n=105). The other two squares showed similar proportions of this hashtag type at 18.0% for Bryant Park (n=72) and at 18.3% for Union Square (n=73). On the other hand, there was no significant association between *place* and the hashtag variables of *emotiveness*, at $\chi^2(2, N=1200) = 3.264$, $p = .196$, Cramér's $V = .05$.; *documentiveness*, at $\chi^2(2, N=1200) = 4.536$, $p = .104$, Cramér's $V = .06$.; *performativeness*, at $\chi^2(2, N=1200) = .732$, $p = .694$, Cramér's $V = .02$.; *city-relatedness*, at $\chi^2(2, N=1200) = 2.210$, $p = .331$, Cramér's $V = .43$.; or *compound word*, at $\chi^2(2, N=1200) = 5.362$, $p = .068$, Cramér's $V = .06$.

Table 4.5.5 A Chi-Square Test for A Collective Sense of Place on Instagram: Place by Hashtag Category

Hashtag Category	**Place**			
t	Bryant Park	Madison Square Park	Union Square	Chi-Square Test
Content-relatedness % within Place % of Total	263 (65.8) (21.9)	286 (71.5) (23.8)	305 (76.3) (25.4)	$\chi^2(2)=10.778$ p <.01 φ = .09 n =1200
Emotiveness % within Place % of Total	98 (24.5) (8.2)	90 (22.5) (7.5)	77 (19.3) (6.4)	$\chi^2(2)=3.264$ p =.196 φ = .05 n =1200
Documentiveness % within Place % of Total	302 (75.5) (25.2)	279 (67.8) (23.3)	302 (75.5) (25.2)	$\chi^2(2)=4.536$ p =.104 φ = .06 n =1200
Performativeness % within Place % of Total	67 (16.8) (5.6)	71 (17.8) (5.9)	62 (15.5) (5.2)	$\chi^2(2)=.732$ p =.694 φ = .02 n =1200
City-relatedness % within Place % of Total	294 (73.5) (24.5)	283 (70.8) (23.6)	275 (68.8) (22.9)	$\chi^2(2)=2.210$ p =.331 φ = .43 n =1200

Among the five main hashtag categories, only *content-relatedness* showed a significant relationship to the research sites. Among *city-relatedness* hashtags, *city-name* and *other place* hashtags showed significant relationships. In the case of *content-relatedness* hashtags, there was no notable difference in users' hashtag behavior between the different sites.

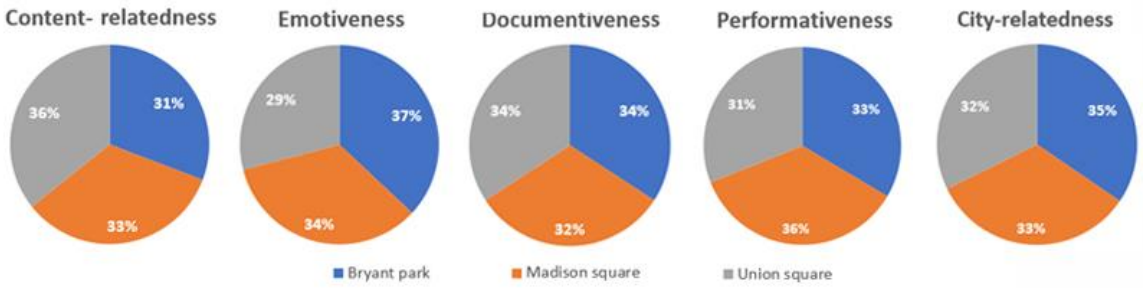

Figure 4.5.6 Distribution of hashtag category by place.

4.6 Post Distribution by Season and Month

To examine user perceptions of seasonal changes, the sampled user-generated content (UGC) from the urban public spaces was analyzed in relation to research sites and content types. Firstly, a chi-square test of independence was performed to examine the relationship between *place* and *season*. The two categorical variables were *place* with three locations, 1) *Bryant Park*, 2) *Madison Square Park*, and 3) *Union Square*, and the four seasons of the year, 1) *spring*, 2) *summer*, 3) *fall*, and 4) *winter*. The chi-square test revealed that the relationship between *place* and *season* was significant, $\chi^2(6, N=1200) = 46.695$, $p < .001$, Cramér's $V = .139$. The dataset as a whole shows a similar distribution over the seasons, with 26.1% (n=313) of the content in fall, 25.6% (n=307) in summer, 24.5% (n=294) in spring, and 23.8% (n=286) in winter. However, seasonal differences can be observed within the content from each research site. As indicated in Table 4.6.1, in Bryant Park the number of posts in winter (33.8%, n=135) is about twice as large as in fall (18.3%, n=73), whereas in Union Square the posts in winter (16.8%, n=67) numbered less than in fall (33.8%, n=135).

Table 4.6.1 A chi-square test for a collective sense of place on Instagram: Place by season

Season	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Spring	88	106	100	
% within Place	(22.0)	(26.5)	(25.0)	
% of Total	(7.3)	(8.8)	(8.3)	
Summer	104	105	98	
% within Place	(26.0)	(26.3)	(24.5)	
% of Total	(8.7)	(8.8)	(8.2)	
Fall	73	105	135	
% within Place	(18.3)	(26.3)	(33.8)	46.695***
% of Total	(6.1)	(8.8%)	(11.3)	
Winter	88	106	100	
% within Place	(22.0)	(26.5)	(25.0)	
% of Total	(7.3)	(8.8)	(8.3)	
Total	400	400	400	
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	

Note: *p<.05, **p<.01, ***p<.001

Posts were distributed relatively even throughout the three sites during the spring and summer, but during autumn and winter, as shown in Figure 4.6.1, each square shows a unique distribution of content based on its characteristics.

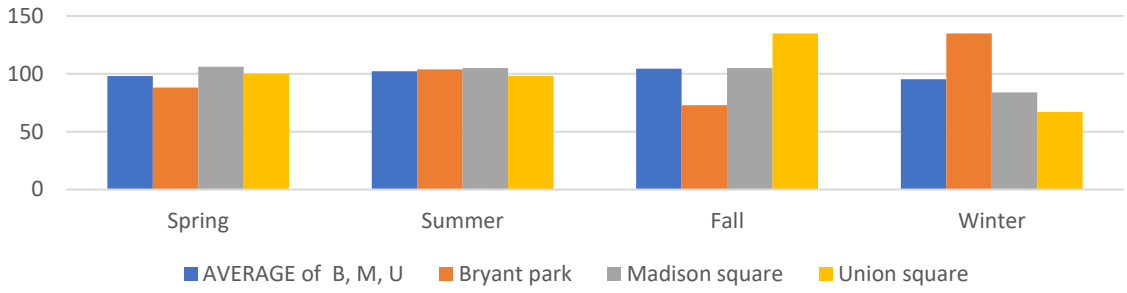

Figure 4.6.1 Distribution of geotagged photographs to urban square by season.

To further understand this seasonal variation, a chi-square test of independence was performed to examine the relationship between place and month. The two categorical variables were place and the twelve months of the year, 1) January, 2) February, 3) March, 4) April, 5) May, 6) June, 7) July, 8) August, 9) September, 10) October, 11) November, and 12) December. The relationship between place and *month* was significant, $\chi^2(22, N=1200) = 70.819$, $p < .001$, Cramér's $V = .17$. Although a similar number of posts was observed across the seasons for the whole sample for this study, differences are observed in the sample posts in relation to each research site. Table 4.6.2 explains the monthly distribution of the sample of UGC; the highest number of posts were recorded in December (11.3%, n=136), followed by 9.3% observed in November (n=112), while the least number of posts were seen in February (5.8%, n=70). Similarly to the seasonal distribution, the distribution of the dataset of each place exhibits differences by *month*. For Bryant Park, December presents the highest number of posts (17.8%, n=71), while the lowest number is shown in March (5.0%, n=20). The highest proportion of posts in Madison Square Park, 11.3% (n=45), is observed in two months, June and October. This

site's lowest score comes in January with 5.8% of the posts (n=23). In the case of Union Square, the quantity of UGC recorded in November is the largest, while the lowest count observed is 4.3% (n=17) in February.

Table 4.6.2 A chi-square test for a collective sense of place on Instagram: place by month

Month	**Place**			χ^2
	Bryant Park	Madison Square Park	Union Square	
Jan	37	23	19	
% within Place	(3.1)	(1.9)	(1.6)	
% of Total	(9.3)	(5.8)	(4.8)	
Feb	28	25	17	
% within Place	(7.0)	(6.3)	(4.3)	
% of Total	(2.3)	(2.1)	(1.4)	
Mar	20	29	29	
% within Place	(5.0)	(7.2)	(7.2)	
% of Total	(1.7)	(2.4)	(2.4)	
Apr	30	42	34	
% within Place	(7.5)	(10.5)	(8.5)	
% of Total	(2.5)	(3.5)	(2.8)	70.819***
May	37	35	37	
% within Place	(9.3)	(8.8)	(9.3)	
% of Total	(3.1)	(2.9)	(3.1)	
Jun	33	45	31	
% within Place	(8.3)	(11.3)	(7.8)	
% of Total	(2.8)	(3.8)	(2.6)	
Jul	36	31	39	
% within Place	(9.0)	(7.8)	(9.8)	
% of Total	(3.0)	(2.6)	(3.3)	
Aug	35	29	28	
% within Place	(8.8)	(7.2)	(7.0)	
% of Total	(2.9)	(2.4)	(2.3)	
Sep	30	29	36	
% within Place	(7.5)	(7.2)	(9.0)	
% of Total	(2.5)	(2.4)	(3.0)	
Oct	20	45	43	
% within Place	(5.0)	(11.3)	(10.8)	
% of Total	(1.7)	(3.8)	(3.6)	
Nov	23	31	58	
% within Place	(5.8)	(7.8)	(14.5)	
% of Total	(1.9)	(2.6)	(4.8)	
Dec	71	36	29	
% within Place	(17.8)	(9.0	(7.2)	
% of Total	(5.9)	(3.0)	(2.4)	
Total	400	400	400	
% within Place	(100)	(100)	(100)	
% of Total	(33.3)	(33.3)	(33.3)	

Note: *p<.05, **p<.01, ***p<.001

Examining the monthly distribution of photographs in each square generates more specific information for understanding users' experiences in and perceptions of the squares than does the seasonal data. As observed in Table 4.6.2 above, the user photographs from the three sites reveal sizable differences in the number of posts in the fall and winter, specifically in the months of October, November and December.

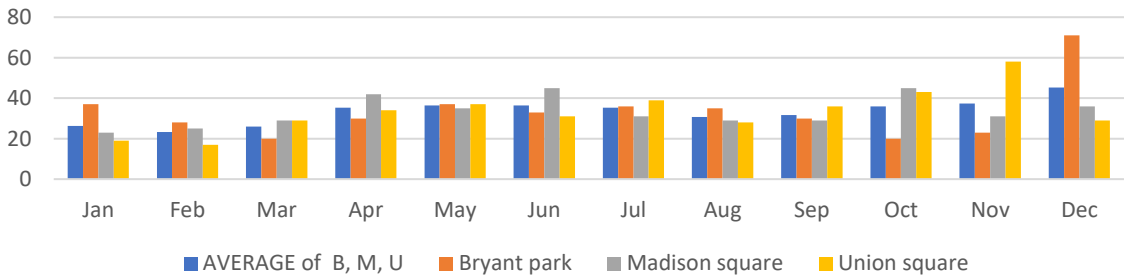

Figure 4.6.2 Distribution of geotagged photographs to urban squares by month.

To examine the relationships between seasonal changes and user photograph types, a set of chi-square tests were performed. Firstly, a chi-square test of independence was performed to examine the relationship between photo category and *season*. The two categorical variables were photo category with three types, 1) *physical setting*, 2) *activity* and 3) *portrait* and the four seasons of the year. As displayed in Table 4.5.3, the relationship between photo category and *season* was significant, $\chi^2(6, N=1200) = 30.326$, $p < .05$, Cramér's $V = .11$. Similar to the distribution of seasonal changes by *place*, differences are observed in the sample posts in relation to each photo type. The highest number of *physical setting* posts were recorded in spring (27.5%, n=170), followed by winter (26.4%, n=163). In contrast to the *physical setting* posts, it is evident that the *activity* category exhibits the largest numbers in fall (30.7%, n=111) and summer (30.1%, n=109). Summer presents the highest number of *portrait* posts (31.4%, n=69), while a similar number of posts was observed across each of the other seasons, spring (20.5%, n=45), fall (20.9%, n=46), and winter (21.0%, n=60).

Table 4.6.3 A chi-square test for a collective sense of place on Instagram: photo category by season

Season	Photo Category				χ^2
	Physical Setting	Activity	Portrait	**Total**	
Spring	170	79.	45	294	
% within Photo	(27.5)	(21.8)	(20.5)		
% of Total	(14.2)	(6.6)	(3.8)	(24.5)	
Summer	129	109	69	307	
% within Photo	(20.9)	(30.1)	(31.4)		
% of Total	(10.8)	(9.1)	(5.8)	(25.6)	
Fall	156	111	46	313	30.326***
% within Photo	(25.2)	(30.7)	(20.9)		
% of Total	(13.0)	(9.3)	(3.8)	(26.1)	
Winter	163	63	60	286	
% within Photo	(26.4)	(22.0)	(21.0)		
% of Total	(13.6)	(5.3)	(5.0)	(23.8)	
Total	618	362	220	1200	
% within Photo	(100)	(100)	(100)		
% of Total	(51.5)	(30.2)	(18.3)	(100)	

Note: *p<.05, **p<.01, ***p<.001

As noted in Figure 4.6.3, the entire sample shows minor differences in terms of photo types based on the different seasons, but the seasonal distribution of photo types is relatively consistent. The results show that users basically express their perceptions of the *physical setting* of the space equally throughout the four seasons. Users tend to share more photographs of programs and activities during summer and fall, while *portraits* are shared most in summer, followed by winter.

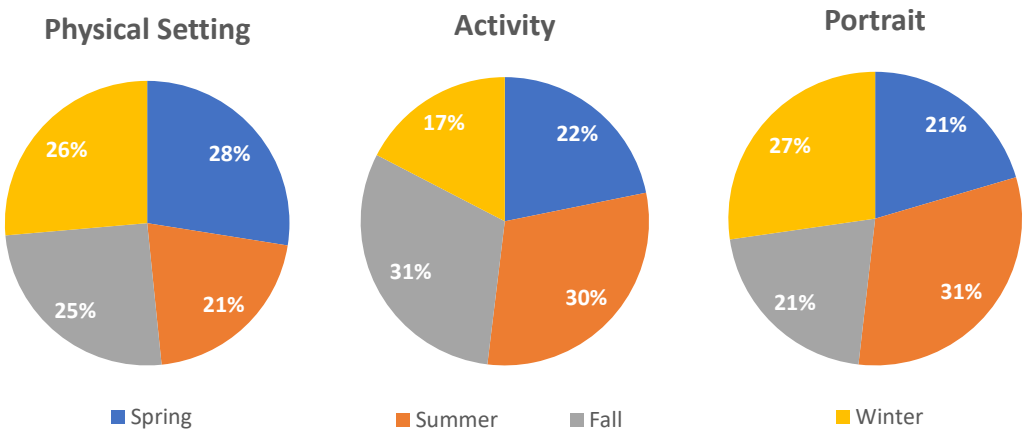

Figure 4.6.3 Distribution of photo category by season.

Next, a chi-square test of independence was performed to examine the relationship between photo category and *month*. The two categorical variables were photo category and the twelve months of the year. As shown in Table 4.5.4, the relationship between photo category and *month* was significant, $\chi^2(22, N=1200) = 82.354$, $p < .001$, Cramér's $V = .18$. Although the highest portion of posts across the four seasons was recorded in fall (33.8%), as shown in Figure 4.6.4, the largest numbers of *physical setting* posts was seen in months of different seasons: April (10.8%, n=67), followed by December (9.9%, n=61) and May (9.7%, n=60). In contrast to this, the highest number of *activity* posts in any one season was in fall (31.0%, n=111), although the highest number recorded in any single month was in June (11.9%, n=43). For the *portrait* type, December (18.2% n=40) presents the highest counts, followed by June (14.1%, n=31), July (9.5%, n=21), and September (8.2%, n=18). In regards to seasonal distribution of user posts as displayed in Table 4.6.4, differences were observed in the distribution of user photograph types by the two variables, *season* and *month*.

Table 4.6.4 A chi-square test for a collective sense of place on Instagram: Photo category by month

Month	**Photo Category**				
	Physical Setting	Activity	Portrait	**Total**	χ^2
Jan	53	16	10	79	
% within Photo	(8.6)	(4.4)	(4.5)		
% of Total	(4.4)	(1.3)	(0.8)	(6.6)	
Feb	48	12	10	70	
% within Photo	(7.8)	(3.3)	(4.5)		
% of Total	(4.0)	(1.0)	(0.8)	(5.8)	
Mar	42	22	14	78	
% within Photo	(6.8)	(6.1)	(6.4)		
% of Total	(3.5)	(1.8)	(1.2)	(6.5)	
Apr	67	23	16	106	
% within Photo	(10.8)	(6.4)	(7.3)		
% of Total	(5.6)	(1.9)	(1.3)	(8.8)	
May	60	34	15	109	
% within Photo	(9.7)	(9.4)	(6.8)		

% of Total	(5.0)	(2.8)	(1.3)	(9.1)	82.354***
Jun	35	43	31	109	
% within Photo	(5.7)	(11.9)	(14.1)		
% of Total	(2.9)	(3.6)	(2.6)	(9.1)	
Jul	37	48	21	106	
% within Photo	(6.0)	(13.3)	(9.5)		
% of Total	(3.1)	(4.0)	(1.8)	(8.8)	
Aug	57	18	17	92	
% within Photo	(9.2)	(5.0)	(7.7)		
% of Total	(4.8)	(1.5)	(1.4)	(7.7)	
Sep	41	36	18	95	
% within Photo	(6.6)	(9.9)	(8.2)		
% of Total	(3.4)	(3.0)	(1.5)	(7.9)	
Oct	60	39	9	108	
% within Photo	(9.2)	(10.8)	(4.2)		
% of Total	(5.0)	(3.3)	(0.8)	(9.0)	
Nov	57	36	19	112	
% within Photo	(4.8)	(9.9)	(1.6)		
% of Total	(4.8)	(3.0)	(1.6)	(9.3)	
Dec	61	35	40	136	
% within Photo	(9.9)	(9.7)	(18.2)		
% of Total	(5.1)	(2.9)	(3.3)	(11.3)	
Total	618	362	220	1200	
% within Photo	(51.5)	(30.2)	(18.2)		
% of Total	(51.5)	(30.2)	(18.3)	(100)	

Note: *p<.05, **p<.01, ***p<.001

As mentioned previously, the distribution of image categories at each square was balanced when examined on the basis of seasons, although this changed significantly when subdividing monthly. During the months of January, February and April, posts mostly comprised the *physical setting* of each site, while *activity* photos were captured the most in June, July and September. In addition, *portraits* appeared most in June and December. Month-by-month analysis clearly provides detail that was lacking when the year was divided into four seasons, giving better insight into how the perceptions and interests of users differ throughout the year.

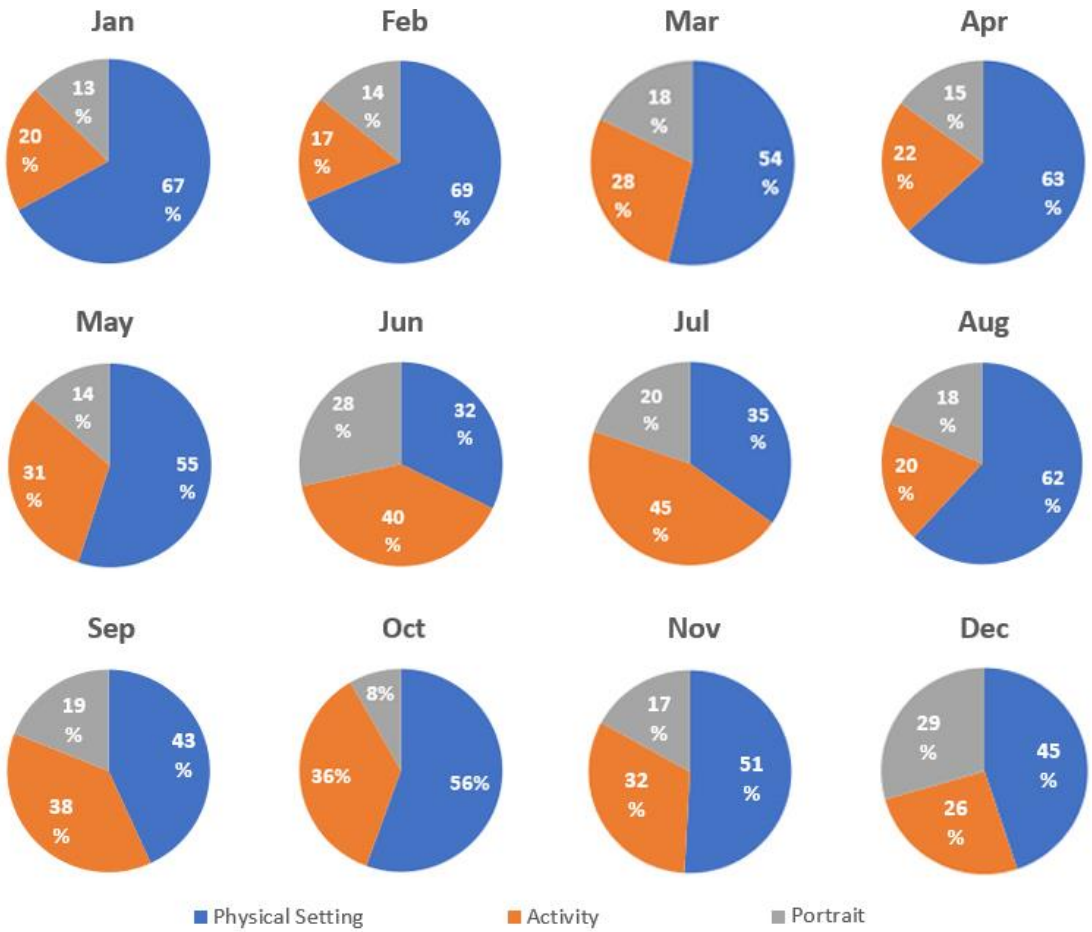

Figure 4.6.4 Distribution of photo category by month.

To further examine seasonal and monthly changes in the UGC, each subcategory of user photos was analyzed in relation to two variables, *season* and *month*. Firstly, a chi-square test of independence was performed to examine the relationship between *physical setting* subcategory and *season*. The two categorical variables were *physical setting* subcategory with seven types, 1) *weather*, 2) *arts*, 3) *architecture*, 4) *history*, 5) *inside*, 6) *surroundings*, and 7) *bird's-eye view* and the four seasons of the year. The relationship between *physical setting* and *season* was significant, $\chi^2(21, N = 1200) = 37.518$, $p < .05$, Cramér's $V = .10$. Specifically, the largest proportions of *weather* and *architecture* posts were seen in winter, at 32.0% (n=8) and 34.7% (n=17) respectively. Meanwhile, user posts of *inside* exhibit relatively even distribution throughout the four seasons: spring (28.4%, n=79), summer (23.7%, n=66), fall (24.1%, 67), and winter (25.4%, n=46). In the

physical setting category, user photos of *surroundings* (17.1%, n=31) and *bird's-eye view* (12.5%, n=4) show their smallest numbers in summer.

Table 4.6.5 A chi-square test for a collective sense of place on Instagram: *physical setting* subcategory of photograph by season

Season	Physical Setting Subcategory								χ^2
	Weather	Arts	Architecture	History	Inside	Surroundings	Bird's-eye view	Total	
Spring % within P_S1 % of Total	7 (28.0) (0.6)	12 (25.0) (1.0)	15 (30.6) (1.3)	0 (0.0) (0.0)	79 (28.4) (6.6)	48 (26.5) (4.0)	9 (28.1) (0.8)	170 (14.3)	
Summer % within P_S1 % of Total	5 (20.0) (0.4)	14 (29.2) (1.2)	8 (16.3) (0.7)	1 (16.7) (0.1)	66 (23.7) (5.5)	31 (17.1) (2.6)	4 (12.5) (0.3)	129 (10.6)	
Fall % within P_S1 % of Total	5 (20.0) (0.4)	10 (20.8) (0.8)	9 (18.4) (0.8)	1 (16.7) (0.1)	67 (24.1) (5.6)	56 (30.9) (4.7)	9 (28.1) (0.8)	157 (13.2)	37.518*
Winter % within P_S1 % of Total	8 (32.0) (0.7)	12 (25.0) (1.0)	17 (34.7) ()	4 (66.7) (0.3)	66 (23.7) (5.5)	46 (25.4) (3.8)	10 (31.3) (0.8)	163 (12.1)	
Total % within P_S1 % of Total	25 (100) (2.1)	48 (100) (4.0)	49 (100) (4.1)	6 (100) (0.5)	278 (100) (23.2)	181 (100) (15.1)	32 (100) (2.7)	619 (51.6)	

Note: *p<.05, **p<.01, ***p<.001

From the even distribution of *physical setting* posts throughout the four seasons, it can be concluded that user photos expressing the physical composition of each square do not show radical seasonal differences. Therefore, imagery of the physical elements of the square are shared in a consistent manner throughout the year; users' images of *physical settings* in the squares including the view of adjacent regional environment are the critical elements in the formation of sense of place on the photo-sharing application Instagram.

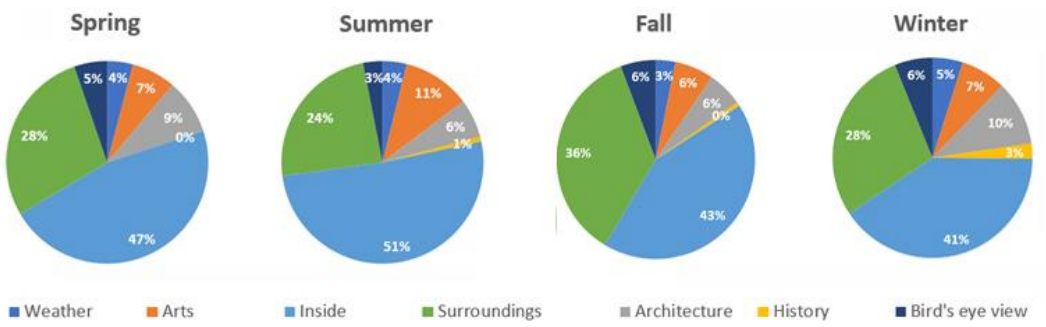

Figure 4.6.5 Distribution of subcategory of *physical setting* by season.

A chi-square test of independence was performed to examine the relationship between *physical setting* subcategory and month. The two categorical variables were *physical setting* subcategory and the twelve months of the year. The relationship between the *physical setting* and *month* variables was significant, $\chi^2(77, N=1200) = 155.223$, $p < .001$, Cramér's $V = .13$.

Table 4.6.6 A Chi-Square Test for A Collective Sense of Place on Instagram: *Physical Setting* Subcategory of Photograph by Month

Month	**Physical Setting Subcategory**								χ^2
	Weather	Arts	Architec-ture	History	Inside	Surroundings	Bird's-eye view	**Total**	
Jan	1	5	7	1	22	14	3	53	
% within P_S1	(4.0)	(10.4)	(14.3)	(16.7)	(7.9)	(7.7)	(9.4)		
% of Total	(0.1)	(0.4)	(0.6)	(0.1)	(1.8)	(1.2)	(0.3)	(4.5)	
Feb	7	4	4	0	20	11	2	48	
% within P_S1	(28.0)	(8.3)	(8.2)	(0.0)	(7.2)	(6.1)	(6.3)		
% of Total	(0.6)	(0.3)	(0.3)	(0.0)	(1.7)	(0.9)	(0.2)	(4.0)	
Mar	4	3	2	0	12	18	3	42	
% within P_S1	(16.0)	(6.3)	(4.1)	(0.0)	(4.3)	(9.9)	(9.4)		
% of Total	(0.3)	(0.3)	(0.2)	(0.0)	(1.0)	(1.5)	(0.3)	(3.6)	
Apr	2	2	5	0	41	14	3	67	
% within P_S1	(8.0)	(4.2)	(10.2)	(0.0)	(14.7)	(7.7)	(9.4)		
% of Total	(0.2)	(0.2)	(0.4)	(0.0)	(3.4)	(1.2)	(0.3)	(5.7)	
May	1	7	8	0	25	16	3	60	
% within P_S1	(4.0)	(14.6)	(16.3)	(0.0)	(9.0)	(8.8)	(9.4)		
% of Total	(0.1)	(0.6)	(0.7)	(0.0)	(2.1)	(1.3)	(0.3)	(5.1)	
Jun	2	6	3	0	16	7	1	35	
% within P_S1	(8.0)	(12.5)	(6.1)	(0.0)	(5.8)	(3.9)	(3.1)		155.223***
% of Total	(0.2)	(0.5)	(0.3)	(0.0)	(1.3)	(0.6)	(0.3)	(3.2)	
Jul	1	3	2	0	17	11	3	37	
% within P_S1	(4.0)	(6.3)	(4.1)	(0.0)	(6.1)	(6.1)	(9.4)		
% of Total	(0.1)	(0.3)	(0.2)	(0.0)	(1.4)	(0.9)	(0.1)	(3.0)	
Aug	2	5	3	1	33	13	0	57	
% within P_S1	(8.0)	(10.4)	(6.1)	(16.7)	(11.9)	(7.2)	(0.0)		
% of Total	(0.2)	(0.4)	(0.3)	(0.1)	(2.8)	(1.1)	(0.0)	(4.9)	
Sep	0	1	0	0	19	19	3	42	
% within P_S1	(0.0)	(2.1)	(0.0)	(0.0)	(6.8)	(10.5)	(9.4)		
% of Total	(0.0)	(0.1)	(0.0)	(0.0)	(1.6)	(1.6)	(0.3)	(3.6)	
Oct	3	7	4	0	20	24	2	60	
% within P_S1	(12.0)	(14.6)	(8.2)	(0.0)	(7.2)	(13.3)	(6.3)		
% of Total	(0.3)	(0.6)	(0.3)	(0.0)	(1.7)	(2.0)	(0.2)	(5.1)	
Nov	2	3	5	1	28	13	5	57	
% within P_S1	(8.0)	(6.3)	(10.2)	(16.7)	(10.1)	(7.2)	(15.6)		
% of Total	(0.2)	(0.3)	(0.4)	(0.1)	(2.3)	(1.1)	(0.4)	(4.8)	
Dec	0	2	6	3	25	21	4	61	
% within P_S1	(0.0)	(4.2)	(12.2)	(50.0)	(9.0)	(11.6)	(12.5)		
% of Total	(0.0)	(0.2)	(0.5)	(0.3)	(2.1)	(1.8)	(0.3)	(5.2)	
Total	25	48	49	6	278	181	32	619	
% within P_S1	(100)	(100)	(100)	(100)	(100)	(100)	(100)		
% of Total	(2.1)	(4.0)	(4.1)	(0.5)	(23.2)	(15.1)	(2.7)	(51.6)	

Note: *p<.05, **p<.01, ***p<.001

In contrast to the similarly distributed imagery of *physical setting* throughout the seasons, the monthly analysis provided a more thorough framework for understanding user perceptions in the urban squares. While the categories of UGC showed similar distributions between seasons, specific months within each season were seen to have higher concentration of certain types of content. Content showing the surrounding environment centered on the months of March, September, and October while photos showing the inner views of each square were found more in April, August, and November.

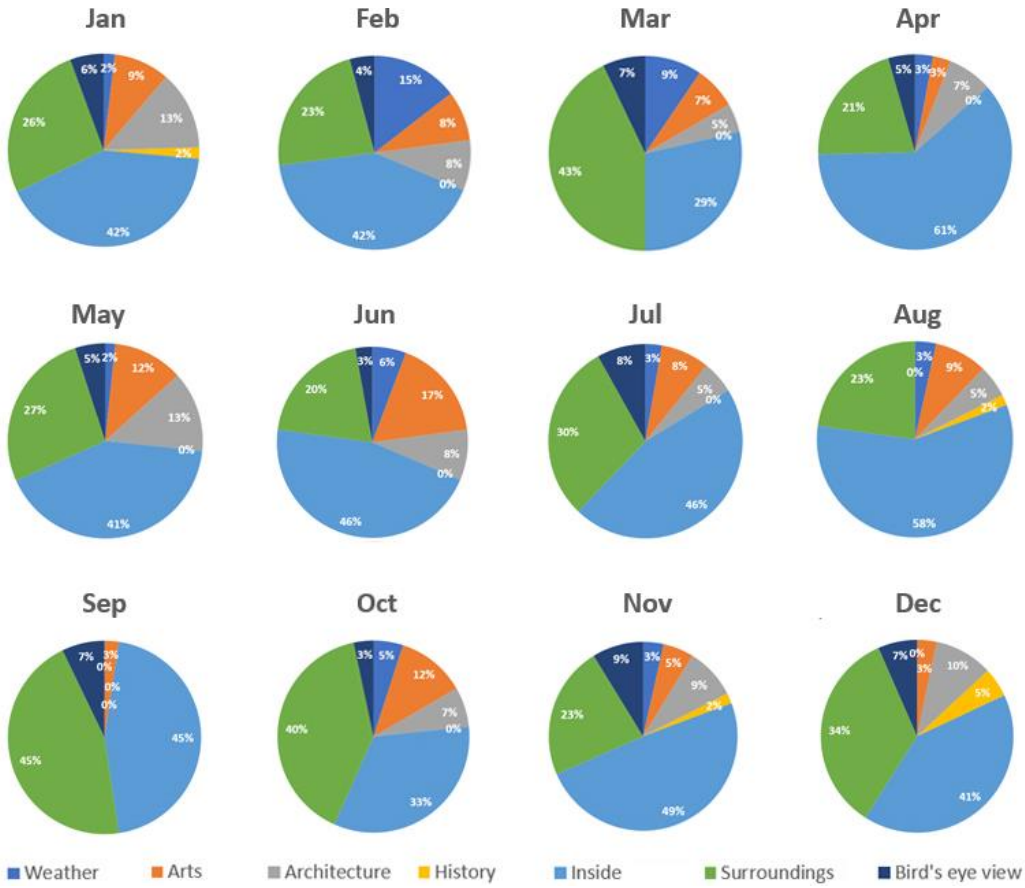

Figure 4.6.6 Distribution of subcategory of *physical setting* by month.

A chi-square test of independence was performed to examine the relationship between *activity* subcategory and season. The two categorical variables were *activity* with six types and the four seasons of the year. As shown in Table 4.6.7, the relationship between *activity* and *season* was significant, $\chi^2(18, N = 1200) = 55.883$, $p < .001$, Cramér's

V =.12. In the case of *events & and cultural activities*, users shared the most amount of content in the summer (38.1%, n=64), while the largest portion of *sports & recreational activities*, nearly half the yearly amount, was posted in the winter (43.2%, n=16). The categories of *foods* and *local businesses* also show more concentration in the fall (40.3%, n=27 and 37.8%, n=14), while almost half of the *local services* photos were distributed in the summer (42.9%, n=6). Lastly, user photographs of *pets* were shared mainly in the spring (30.8%, n=12) and fall (30.8%, n=12).

Table 4.6.7 A chi-square test for a collective sense of place on Instagram: *Activity* subcategory of photograph by season

Season	**Activity Subcategory**							χ^2
	Events & cultural activities	Sports & recreational activities	Foods	Local businesses	Local services	Pets	**Total**	
Spring	38	9	11	7	2	12	79	
% within P_S2	(22.6)	(24.3)	(16.4)	(18.9)	(14.3)	(30.8)		
% of Total	(3.2)	(0.8)	(0.9)	(0.6)	(0.2)	(1.0)	(6.7)	55.883***
Summer	64	7	15	11	6	6	109	
% within P_S2	(38.1)	(18.9)	(22.4)	(29.7)	(42.9)	(15.4)		
% of Total	(5.3)	(0.6)	(1.3)	(0.9)	(0.5)	(0.5)	(9.1)	
Fall	48	5	27	14	3	14	111	
% within P_S2	(28.6)	(13.5)	(40.3)	(37.8)	(21.4)	(35.9)		
% of Total	(4.0)	(0.4)	(2.3)	(1.2)	(0.3)	(1.2)	(9.4)	
Winter	18	16	14	5	3	7	63	
% within P_S2	(10.7)	(43.2)	(20.9)	(13.5)	(21.4)	(17.9)		
% of Total	(1.5)	(1.3)	(1.2)	(0.4)	(0.3)	(0.6)	(5.3)	
Total	168	37	67	37	14	39	362	
% within P_S2	(100)	(100)	(100)	(100)	(100)	(100)		
% of Total	(14.0)	(3.1)	(5.6)	(3.1)	(1.2)	(3.3)	(30.3)	

Note: *p<.05, **p<.01, ***p<.001

It turns out that users in the urban squares post greater amounts of specific types of content based on the season; *pets*-related material in the spring, culturally focused posts in the summer, *food* in the fall, and *sports & recreational* content in the winter. Additionally, the number of photos belonging to the *activities* category as a whole was seen to vary throughout the seasons, and *events & cultural activities* was the largest subcategory in each square across all four seasons.

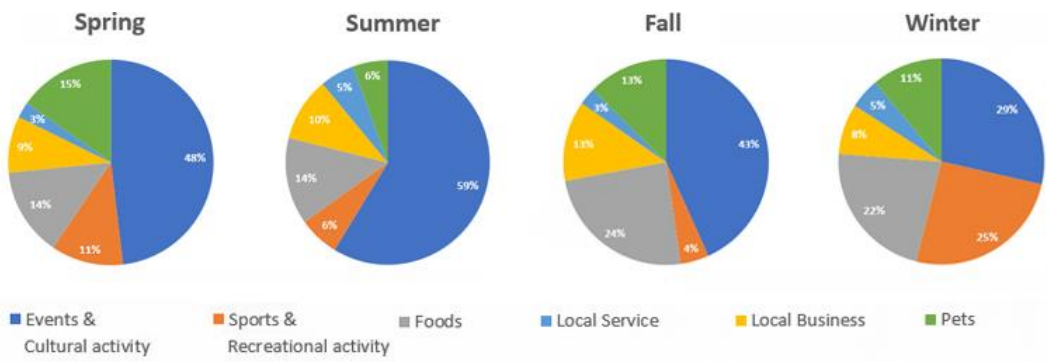

Figure 4.6.7 Distribution of subcategory of *activity* by season.

A chi-square test of independence was performed to examine the relationship between *activity* subcategory and *month*. The two categorical variables were *activity* subcategory with six types and the twelve months of the year. The relationship between these variables was significant, $\chi^2(66, N=1200) = 149.197$, $p < .001$, Cramér's $V = .14$. It is confirmed that *events & cultural activities*–related material was shared the most in the months of May (12.5%, n=21) and July (21.4%, n=36). As mentioned earlier during the study of the seasonal distribution of content, *sports & recreational activities* were posted more from December through March, especially in December (21.6%, n=8). In the case of *foods*, November and December showed the largest amounts of content at 17.9% each (n=12). Interestingly, in contrast to this, even though *pets*-related postings were uploaded most in the spring and autumn, January showed the most posts of any month in the year (12.8%, n=5).

Table 4.6.8 A chi-square test for a collective sense of place on Instagram: *Activity* subcategory of photograph by month

Month	**Activity subcategory**							χ^2
	Event & cultural activities	Sports & recreational activities	Foods	Local businesses	Local services	Pets	**Total**	
Jan	3	3	2	1	2	5	16	
% within P_S2	(1.8)	(8.1)	(3.0)	(2.7)	(14.3)	(12.8)		
% of Total	(0.3)	(0.3)	(0.2)	(0.1)	(0.2)	(0.4)	(1.5)	
Feb	2	5	0	3	1	1	12	

% within P_S2	(1.2)	(13.5)	(0.0)	(8.1)	(7.1)	(2.6)		
% of Total	(0.2)	(0.4)	(0.0)	(0.3)	(0.1)	(0.1)	(1.1)	
Mar	8	5	3	0	1	5	22	
% within P_S2	(4.8)	(13.5)	(4.5)	(0.0)	(7.1)	(12.8)		
% of Total	(0.7)	(0.4)	(0.3)	(0.0)	(0.1)	(0.4)	(1.9)	
Apr	9	4	4	3	1	2	23	
% within P_S2	(5.4)	(10.8)	(6.0)	(8.1)	(7.1)	(5.1)		
% of Total	(0.8)	(0.3)	(0.3)	(0.3)	(0.1)	(0.2)	(2.0)	
May	21	0	4	4	0	5	34	
% within P_S2	(12.5)	(0.0)	(6.0)	(10.8)	(0.0)	(12.8)		
% of Total	(1.8)	(0.0)	(0.3)	(0.3)	(0.0)	(0.4)	(2.8)	
Jun	22	4	5	6	3	3	43	149.197***
% within P_S2	(13.1)	(10.8)	(7.5)	(16.2)	(21.4)	(7.7)		
% of Total	(1.8)	(0.3)	(0.4)	(0.5)	(0.3)	(0.3)	(3.6)	
Jul	36	2	5	3	0	2	48	
% within P_S2	(21.4)	(5.4)	(7.5)	(8.1)	(0.0)	(5.1)		
% of Total	(3.0)	(0.2)	(0.4)	(0.3)	(0.0)	(0.2)	(4.1)	
Aug	6	1	5	2	3	1	18	
% within P_S2	(3.6)	(2.7)	(7.5)	(5.4)	(21.4)	(2.6)		
% of Total	(0.5)	(0.1)	(0.4)	(0.2)	(0.3)	(0.1)	(1.6)	
Sep	15	2	7	7	1	4	36	
% within P_S2	(8.9)	(5.4)	(10.4)	(18.9)	(7.1)	(10.3)		
% of Total	(1.3)	(0.2)	(0.6)	(0.2)	(0.1)	(0.3)	(2.7)	
Oct	19	0	8	6	2	4	39	
% within P_S2	(11.3)	(0.0)	(11.9)	(16.2)	(14.3)	(10.3)		
% of Total	(1.6)	(0.0)	(0.7)	(0.6)	(0.2)	(0.3)	(3.4)	
Nov	14	3	12	1	0	6	36	
% within P_S2	(8.3)	(8.1)	(17.9)	(2.7)	(0.0)	(15.4)	(3.5)	
% of Total	(1.2)	(0.3)	(1.0)	(0.5)	(0.0)	(0.5)		
Dec	13	8	12	1	0	1	35	
% within P_S2	(7.7)	(21.6)	(17.9)	(2.7)	(0.0)	(2.6)		
% of Total	(1.1)	(0.7)	(1.0)	(0.1)	(0.0)	(0.1)	(3.0)	
Total	168	37	67	37	14	39	362	
% within P_S2	(100)	(100)	(100)	(100)	(100)	(100)		
% of Total	(14.0)	(3.1)	(5.6)	(0.1)	(1.2)	(3.3)	(27.3)	

Note: *p<.05, **p<.01, ***p<.001

Photos reflecting the activities and programs of each square show a vast variety among the seasons, although the contrast is more drastic in the monthly distribution. The different content the users shared the most per each season are consistently shown on the monthly analysis by providing more detailed information about people's perceptions observed across the research sites. For instance, user photographs of *sports & recreational activities* were seen most in winter, followed by spring; this image type was found in large numbers throughout all winter months, December, January, and February, while not a

single photo was observed in May, even though spring was the second most common season for photos of *sports & recreational activities*.

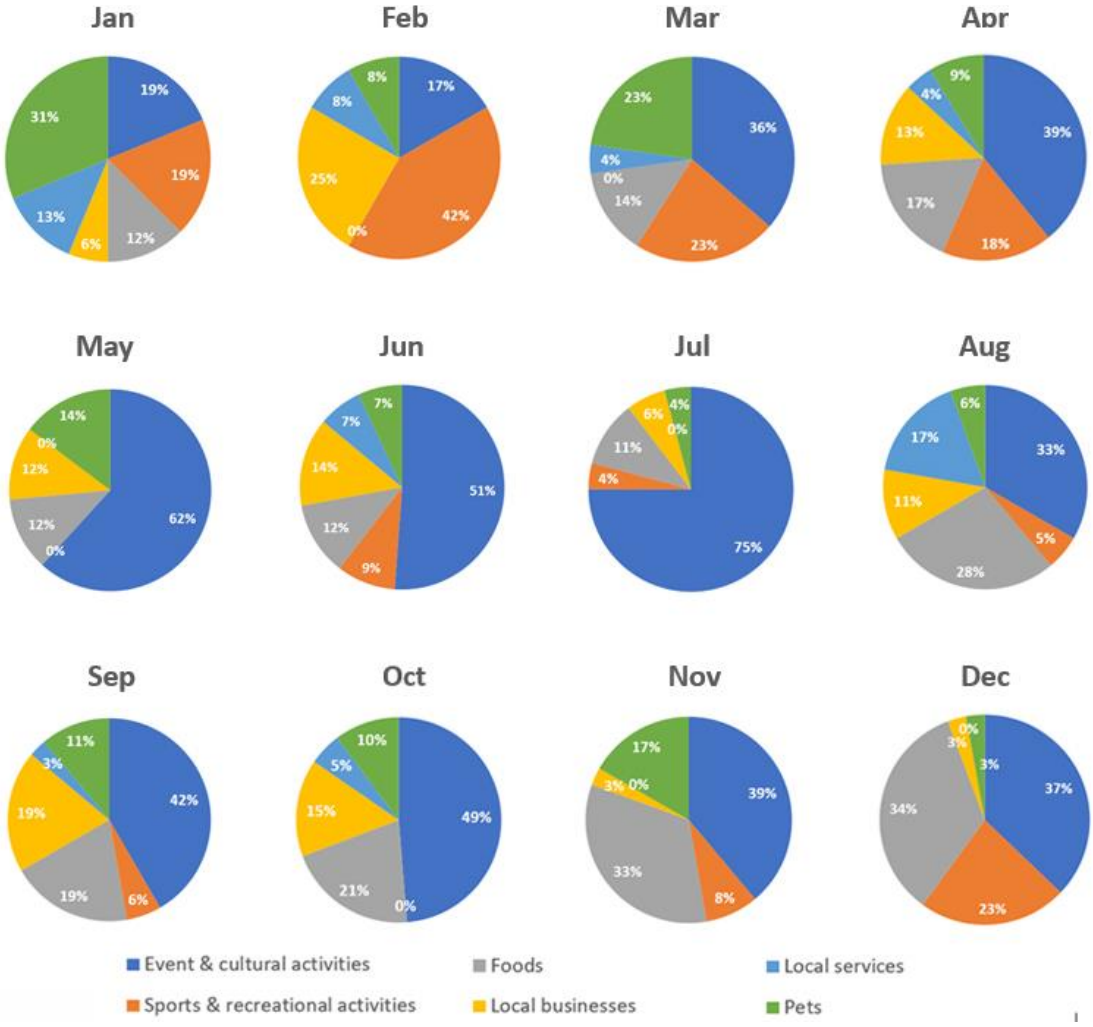

Figure 4.6.8 Distribution of subcategory of *activity* by season

A chi-square test of independence was performed to examine the relationship between *portrait* subcategory and *season*. The two categorical variables were *portrait* and *season*. There was no significant association between *portrait* and season, $\chi^2(6, N = 1200) = 11.289$, $p = .080$, Cramér's $V = .69$.

Table 4.6.9 A chi-square test for a collective sense of place on Instagram: *Portrait* subcategory of photograph by season

Season	Portrait Subcategory			χ^2
	Individual	Group	Total	
Spring	25	20	45	11.289
% within P_S3	(21.0)	(19.4)		
% of Total	(2.1)	(1.7)	(3.8)	
Summer	40	29	69	
% within P_S3	(33.6)	(28.2)	(5.7)	
% of Total	(3.3)	(2.4)		
Fall	27	21	48	
% within P_S3	(22.7)	(20.4)		
% of Total	(2.3)	(1.8)	(4.1)	
Winter	27	33	60	
% within P_S3	(22.7)	(32.0)		
% of Total	(2.3)	(2.8)	(5.1)	
Total	119	103	222	
% within P_S3	(100)	(100)		
% of Total	(9.9)	(8.6)	(18.5)	

Note: *p<.05, **p<.01, ***p<.001

Single person portraits were generally posted in larger numbers during spring, summer, and fall than winter. Winter was the only season in which *group* photos outnumbered single-person imagery.

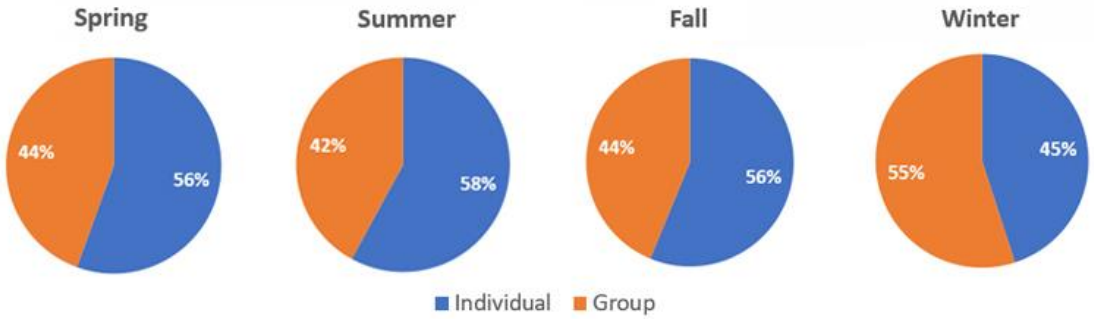

Figure 4.6.9 Distribution of subcategory of *portrait* by season

A chi-square test of independence was performed to examine the relationship between *portrait* subcategory and *month*. The two categorical variables were *portrait* subcategory with three types and the twelve months of the year. The relationship between these variables was significant, $\chi^2(22, N=1200) = 44.330$, $p < .01$, Cramér's $V = .13$.

Table 4.5.10 A chi-square test for a collective sense of place on Instagram: *Portrait* subcategory of photograph by month

Month	**Portrait Subcategory**			χ^2
	Individual	Group	**Total**	
Jan	8	2	10	
% within P_S3	(6.7)	(1.9)		
% of Total	(0.7)	(0.2)	(0.9)	
Feb	4	6	10	
% within P_S3	(3.4)	(5.8)		
% of Total	(0.3)	(0.5)	(0.8)	
Mar	6	8	14	
% within P_S3	(5.0)	(7.8)		
% of Total	(0.5)	(0.7)	(1.2)	
Apr	10	6	16	
% within P_S3	(8.4)	(5.8)		
% of Total	(0.8)	(0.5)	(1.3)	
May	9	6	15	
% within P_S3	(7.6)	(5.8)		
% of Total	(0.8)	(0.5)	(1.3)	44.330**
Jun	19	12	15	
% within P_S3	(16.0)	(11.7)		
% of Total	(1.6)	(1.0)	(1.3)	
Jul	9	12	31	
% within P_S3	(7.6)	(11.7)		
% of Total	(0.8)	(1.0)	(2.6)	
Aug	12	5	21	
% within P_S3	(7.6)	(11.7)		
% of Total	(1.0)	(0.4)	(1.8)	
Sep	11	7	18	
% within P_S3	(10.1)	(4.9)		
% of Total	(0.9)	(0.6)	(1.5)	
Oct	6	4	10	
% within P_S3	(5.0)	(3.9)		
% of Total	(0.5)	(0.3)	(0.8)	
Nov	10	10	20	
% within P_S3	(8.4)	(9.7)		
% of Total	(0.8)	(0.8)	(1.6)	
Dec	15	25	40	
% within P_S3	(12.6)	(24.3)	()	
% of Total	(1.3)	(2.1)	(3.4)	
Total	119	103	222	
% within P_S3	(100)	(100)		
% of Total	(9.9)	(8.6)	(18.5)	

Note: *p<.05, **p<.01, ***p<.001

Unlike the seasonal results of *portrait* photos, which were quite uniform throughout the four seasons, the monthly results show significant differences in the patterns of user perception throughout twelve months. Single-person images turned out to

be the main content in January as well as in August, September, and October, while group photos were issued more in December along with the months of March and July.

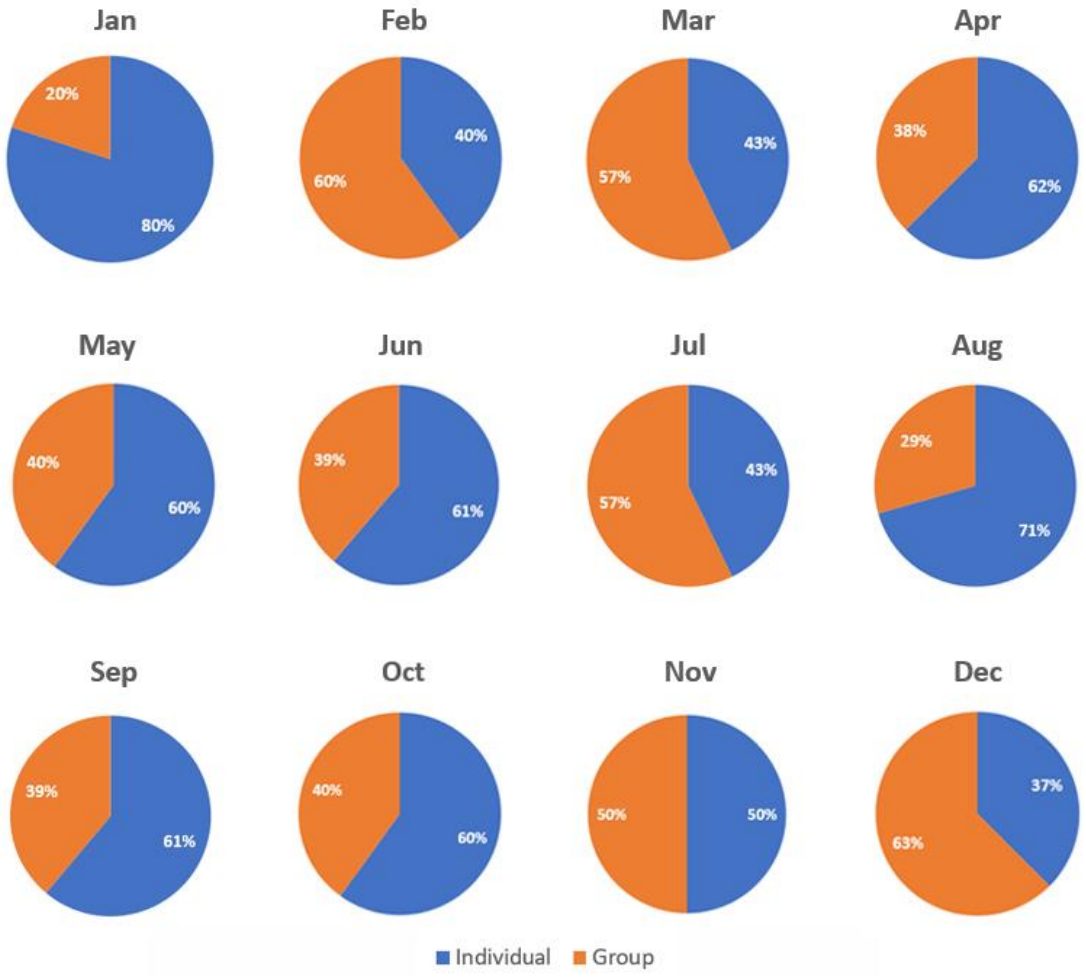

Figure 4.6.10 Distribution of subcategory of *activity* by month

A set of chi-square tests of independence was performed to examine the relationship between *season* and hashtag category. The two categorical variables were the four seasons of the year and hashtag category with eight types, 1) *content-relatedness*, 2) *emotiveness*, 3) *documentiveness*, 4) *performativeness*, 5) *city-relatedness*, 6) *city name*, 7) *other place*, and 8) *compound word*. As shown in Table 4.5.10, the relationship between *season* and *city name* was significant, $\chi^2(3, N=1200) = 9.103$, $p < .05$, Cramér's $V = .08$. On the other hand, there was no significant association between *season* and any other hashtag categories; the results of the chi-square tests were $\chi^2(3, N=1200) = 5.824$, p

=.121, Cramér's V =.07 for *content-relatedness*; $\chi^2(3, N=1200) = 5.454$, p =.141, Cramér's V =.67 for *emotiveness*; $\chi^2(3, N=1200) = 6.482$, p =.09, Cramér's V =.07 for *documentiveness*; $\chi^2(3, N=1200) = 6.195$, p =.670, Cramér's V =.03 for *performativeness*; $\chi^2(3, N=1200) = 6.195$, p =.103, Cramér's V =.07 for *city-relatedness*; $\chi^2(3, N=1200) = 3.710$, p =.295, Cramér's V =.56 for *other place*; and $\chi^2(3, N=1200) = .879$, p =.843, Cramér's V =.02 for *compound word*.

Table 4.6.11 A chi-square test for a collective sense of place on Instagram: Hashtag category by season

Hashtag Category	**Season**				Chi-square Test
	Spring	Summer	Fall	Winter	
Content-relatedness % within Season % of Total	194 (66.0) (16.2)	219 (71.3) (18.3)	233 (74.4) (19.4)	208 (72.7) (17.3)	$\chi^2(3)=5.824$ p =.121 φ = .07 n =1200
Emotiveness % within Season % of Total	69 (23,5) (5.8)	59 (19.2) (4.9)	81 (25.9) (6.8)	56 (19.6) (4.7)	$\chi^2(3)=5.454$ p =.141 φ = .67 n =1200
Documentiveness % within Season % of Total	232 (78.9) (19.3)	218 (71.0) (18.2)	222 (70.9) (18.5)	211 (73.8) (17.6)	$\chi^2(3)=6.482$ p =.09 φ = .07 n =1200
Performativeness % within Season % of Total	47 (16.0) (3.9)	46 (15.0) (3.8)	58 (18.5) (4.8)	49 (17.1) (4.1)	$\chi^2(3)=1.552$ p =.670 φ = .03 n =1200
City-relatedness % within Season % of Total	213 (72.4) (17.8)	209 (68.1) (17.4)	213 (68.1) (17.8)	217 (75.9) (18.1)	$\chi^2(3)=6.195$ p =.103 φ = .07 n =1200
City name % within Season % of Total	183 (62.2) (15.3)	171 (55.7) (14.2)	183 (58.5) (15.3)	192 (67.1) (16.0)	$\chi^2(3)=9.130$ p <.05 φ = .08 n =1200
Other place % within Season % of Total	59 (20.1) (4.9)	64 (20.8) (5.3)	57 (18.2) (4.8)	70 (24.5) (5.8)	$\chi^2(3)=3.710$ p =.295 φ = .56 n =1200
Compound word % within Season % of Total	59 (20.1) (4.9)	67 (21.8) (5.6)	66 (21.1) (5.5)	66 (23.1) (5.5)	$\chi^2(3)=.879$ p =.842 φ = .02 n =1200

The only hashtag type to show a significant relationship to *season* was *city name*. People tended to include a large number of city-related hashtags with their photographs

captured in urban public spaces, although this type of hashtag was observed least in the photographs shared in *summer*.

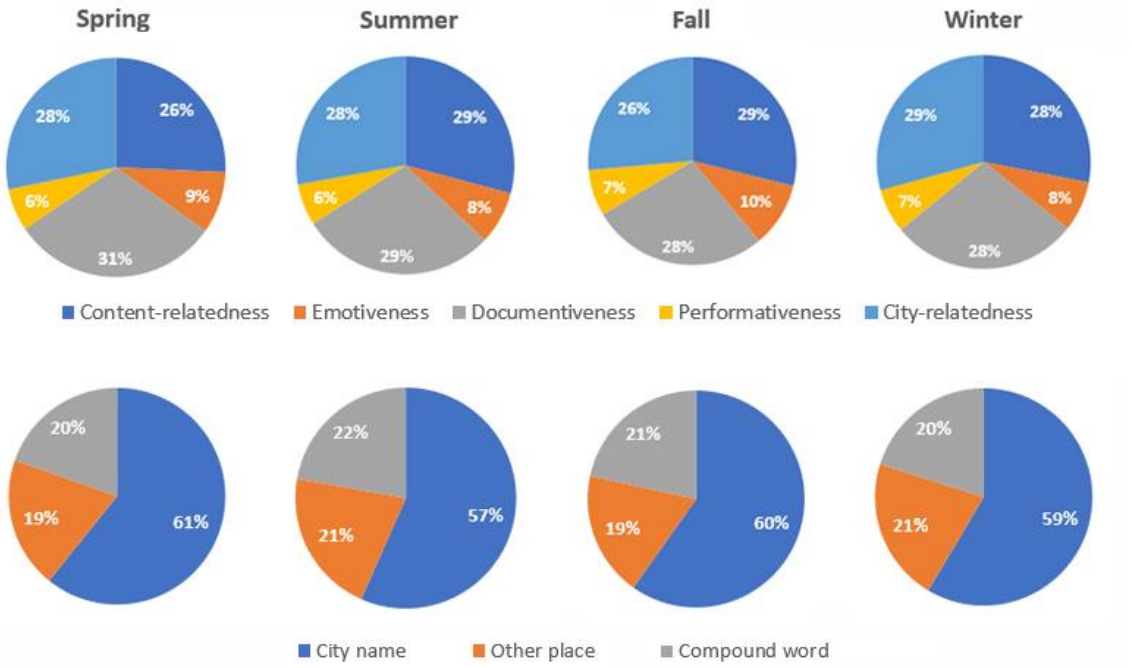

Figure 4.6.11 Distribution of hashtag category by season

A set of chi-square tests of independence was performed to examine the relationship between *month* and hashtag category. The two categorical variables were the twelve months of the year and hashtag category with eight types. The relationship between month and *content-relatedness* was significant, $\chi^2(11, N=1200) = 21.275$, $p < .05$, Cramér's $V = .13$. On the other hand, there were no significant association between *month* and any other hashtag categories: *emotiveness*, at $\chi^2(11, N=1200) = 7.901$, $p = .721$, Cramér's $V = .08$.; *documentiveness*, at $\chi^2(11, N=1200) = 18.003$, $p = .0821$, Cramér's $V = .12$; *performativeness*, at $\chi^2(11, N=1200) = 15.375$, $p = .166$, Cramér's $V = .11$; *city-relatedness*, at $\chi^2(11, N=1200) = 14.035$, $p = .231$, Cramér's $V = .10$; *city name*, at $\chi^2(11, N=1200) = 19.493$, $p = .053$, Cramér's $V = .12$; *other place*, at $\chi^2(11, N=1200) = 10.599$, p

=.477, Cramér's V =.09; or *compound word*, at $\chi^2(11, N=1200) = 5.664$, p =.895, Cramér's V =.06.

Table 4.6.12 A chi-square test for a collective sense of place on Instagram: hashtag category by month

Hashtag Category	Month												Chi-Square Test
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Content-relatedness % within Month % of Total	54 (68.4) (4.5)	55 (78.6) (4.6)	57 (73.1) (4.8)	65 (61.3) (5.4)	71 (65.1) (5.9)	87 (79.8) (7.2)	76 (71.7) (6.3)	56 (60.9) (4.7)	68 (71.6) (5.7)	85 (78.7) (7.1)	82 (73.2) (6.8)	96 (72.1) (8.2)	χ^2 (11)=21.275 p <.05 φ = .13 n =1200
Emotiveness % within Month % of Total	15 (19.0) (1.3)	15 (21.4) (1.3)	18 (23.1) (1.5)	22 (20.8) (1.8)	29 (26.6) (2.4)	24 (22.0) (2.0)	21 (19.8) (1.8)	14 (15.2) (1.2)	25 (26.3) (2.1)	28 (25.9) (2.3)	28 (25.0) (2.3)	26 (19.1) (2.2)	χ^2 (11)=7.901 p =.721 φ = .08 n =1200
Documentiveness % within Month % of Total	62 (78.5) (5.2)	50 (71.4) (4.2)	56 (71.8) (4.7)	87 (82.1) (7.2)	88 (80.7) (7.3)	79 (72.5) (6.6)	71 (67.0) (5.9)	68 (73.9) (5.7)	60 (63.2) (5.0)	76 (70.4) (6.3)	88 (78.6) (7.3)	98 (72.1) (8.2)	χ^2 (11)=18.003 p =.082 φ = .12 n =1200
Performativeness % within Month % of Total	18 (22.8) (1.5)	8 (11.4) (0.7)	17 (21.8) (1.4)	12 (11.3) (1.0)	18 (16.5) (1.5)	10 (9.2) (0.8)	19 (17.9) (1.6)	17 (18.5) (140)	13 (13.7) (1.1)	20 (18.5) (1.7)	25 (22.3) (2.1)	23 (16.9) (1.9)	χ^2 (11)=15.375 p =.166 φ = .11 n =1200
City-relatedness % within Month % of Total	62 (78.5) (5.2)	51 (72.9) (4.3)	55 (70.5) (4.6)	76 (71.7) (6.3)	81 (74.3) (6.8)	71 (65.1) (5.9)	70 (66.0) (5.8)	68 (73.9) (5.7)	62 (65.3) (5.2)	68 (63.0) (5.7)	85 (75.9) (7.1)	103 (75.7) (8.6)	χ^2 (11)=14.035 p =.231 φ = .10 n =1200
City name % within Month % of Total	54 (68.4) (4.5)	47 (67.1) (3.9)	46 (59.0) (3.8)	65 (61.3) (5.4)	71 (65.1) (5.9)	60 (55.0) (5.0)	54 (50.9) (4.5)	57 (62.0) (4.8)	50 (52.6) (4.2)	58 (63.7) (4.8)	77 (68.8) (6.4)	90 (66.2) (7.5)	χ^2 (11)=19.493 p =.053 φ = .12 n =1200
Other place % within Month % of Total	24 (30.4) (2.0)	15 (21.4) (1.3)	12 (15.4) (1.0)	24 (22.6) (2.0)	23 (21.1) (1.9)	25 (22.9) (2.1)	17 (16.0) (1.4)	22 (23.9) (1.8)	15 (15.8) (1.3)	19 (17.6) (1.6)	24 (21.4) (2.0)	30 (22.1) (2.5)	χ^2 (11)=10.599 p =.477 φ = .09 n =1200
Compound word % within Month % of Total	23 (29.1) (1.9)	12 (17.1) (1.0)	16 (20.5) (1.3)	21 (19.8) (1.8)	22 (20.2) (1.8)	21 (19.3) (1.8)	22 (20.8) (1.8)	24 (26.1) (2.0)	22 (23.2) (1.8)	22 (20.4) (1.8)	23 (20.5) (1.9)	30 (22.1) (2.5)	χ^2 (11)=5.664 p =.895 φ = .06 n =1200

In terms of the relationship to the variable *month*, *content-relatedness* tags is the only type of hashtag to show a significant relationship with the twelve months. The content-related hashtags were observed to have a larger variation throughout the months than across the four seasons. The largest portion of the content-related hashtags was found in February at 78.6%; the least portion was observed in August at 60.9%. In terms of season, the highest quantity was found in fall at 74.4%; meanwhile, the lowest was in spring at 66.0%; there was about only 7.6% difference found between the seasons.

Therefore, it appears that the monthly data of people's hashtag usage provides larger differences and details than the data sampled by seasons.

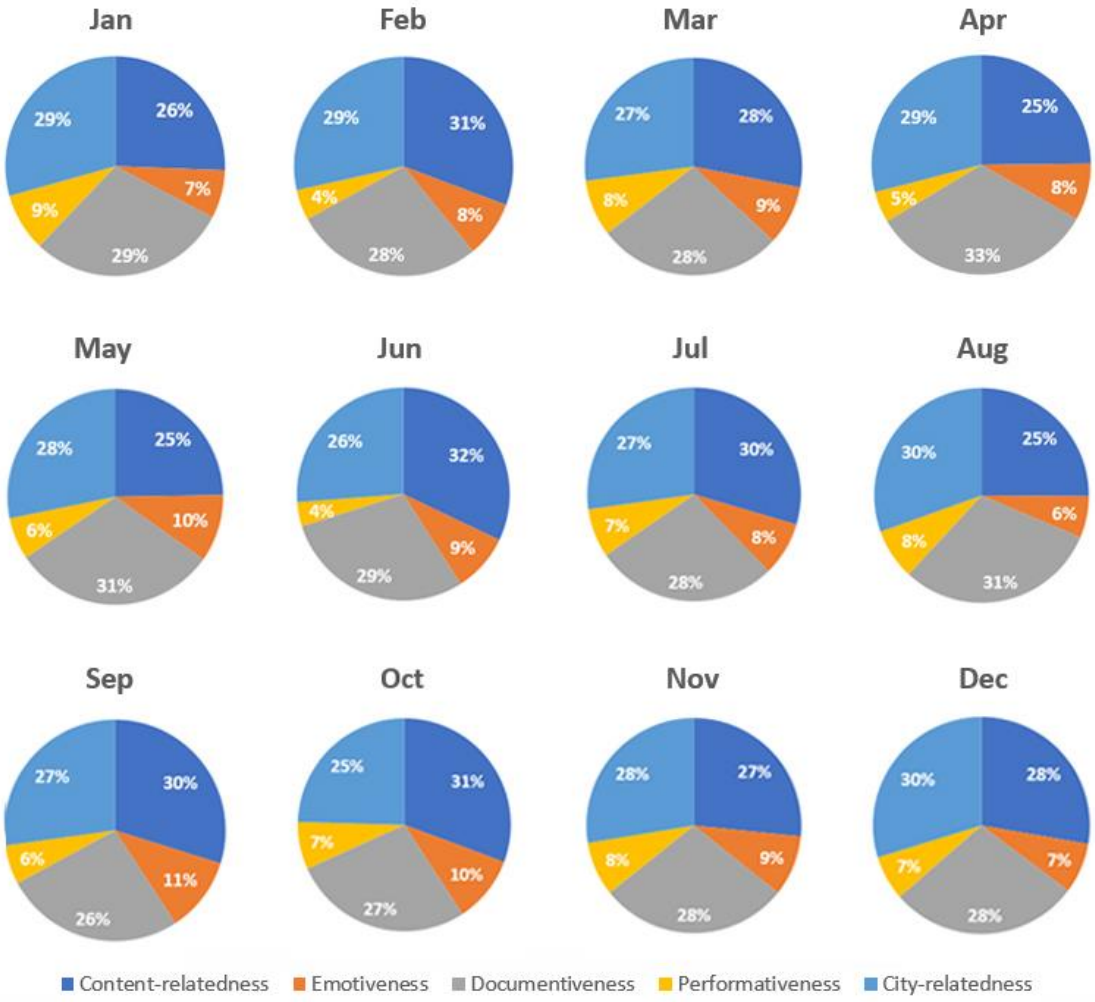

Figure 4.6.12 Distribution of hashtag category by month

4.7 Summary

This chapter presented the results of descriptive analysis and the series of chi-square tests to answer each of the research questions. Overall, the sample of 1,200 posts provided both similarities and differences in the patterns of image and hashtag categories across the three research sites, Bryant Park, Madison Square Park, and Union Square in New York City. Firstly, *physical setting* formed the largest portion of the sample from Instagram, while *inside* and *events & cultural activities* were the most popular types of image among subcategories of *physical setting* and *activity*. All three types of *photograph, physical setting, activity* and *portait*, revealed significant relationships with the research sites. The findings revealed a distinct experience for each urban square, while no difference in hashtag patterns was observed between the research sites. In terms of hashtags, a significant portion of the sample contained three types of hashtag, *content-relatedness, documentiveness*, and *city-relatedness.* In addition, there was sufficient evidence to support a strong association of the geotagged UGC with an urban identity expressed through *city-relatedness* tags. While a relatively small portion of the UGC contained emotive hashtags, indicating a much less significant relationship with these tags. Lastly, the findings that emerged from seasonal and monthly analysis show the data interval/unit of the sample for analysis can affect in interpreting to a greater or lesser degree. The results from the statistical analysis will be thoroughly discussed in the next chapter.

CHAPTER FIVE: DISCUSSION

Introduction

The primary purpose of this study was to understand a collective sense of place represented on the image-based social media platform Instagram through individuals' subjective visual evidence published in contemporary urban public spaces. This research was also designed to identify the characteristics of user-generated content (UGC) on the photo-sharing social media outlet to complement the existing body of literature on sense of place that utilizes social media data. This chapter discusses the findings of the quantitative content analysis of the UGC, focusing on user-generated photographs and their associated hashtags, in relation to the overall perception and characteristics of the UGC in urban squares on Instagram. To assess these aspects in depth, this study examined the association between the following variables for each research question: photograph type, hashtag type, research location, and month and season. The significant findings and the implications for the existing scholarship are examined simultaneously.

As discussed in Chapter 2, *sense of place* can be established at various scales and scopes or ranges and is formed differently at the community level than at the individual level. Regardless of the varied intensity of individuals' relationship to a place, 1200 users' visual contents were equally treated in interpreting a sense of place on Instagram. Given the complexity and diversity of approaches in the literature to understanding sense of place, as well as the varied types of social media applications, it is important to note that the user content collected here cannot be directly interpreted or represented as sense of place of urban space in general. Rather, it should be seen as a constituent of sense of place in the digital environment created by people's perceptions on one particular social media application, Instagram.

This chapter is organized into five sections, beginning with a discussion of the overall landscape of user content in urban squares in relation to the types of user-generated photographs and hashtags. It then discusses the relationships between sets of two variables to determine any significant patterns in the publication of UGC in public spaces in the second and third section. Special emphasis is placed on two particular types of hashtags, emotional hashtags and city-related tags, both to determine whether these data can be used to evaluate emotional values in urban spaces and to identify connections to the image of the city on social media. The following sections discuss the distinctiveness of the three research sites—Bryant Park, Madison Square Park, and Union Square—as characterized in the sampled UGC in relation to seasonal variations in the fourth and the final sections.

5.1 Overall Perception in Urban Squares

Research question 1 (RQ1)

> *Sense of place is an ever-changing concept tangled with people's perceptions, the society and the culture it is in. Therefore, various approaches to understand the sense of place have been taken, each in accordance with each its own research area. The era of social media, the so-called Web 2.0 era, has provided a new opportunity to examine sense of place that was not available before. User-generated textual or image content provide information shared through various social media platforms. Perceptions achieved through such content can vary among the types of the platforms being used as the multitudes of the social media platforms cover a wide range of the user interests. Which raises the question of how people describe urban public spaces with image content and hashtags on Instagram, a photo-sharing social media platform.*

The findings of this research suggest that the physical attributes of urban squares are the essential elements for the formation of a sense of place on the visual social media platform Instagram. Images depicting physical setting make up more than half of user content and it occupies the greatest part of the immediate perceptions by offering behavior settings with "invitational quality" (Lang & Marshall, 2017, p. 34). As *a sense of place* is

influenced by subjective and interpretive perspective of an individual (Relph, 1976) or a group of people. This finding can give insight into a collective perception in urban public space formed by Instagram user group. As the largest portion of user demographic of Instagram is Millennials, it can be inferred that the physical or spatial encounter at a place is likely to be considered as 'insta-worthy' by subjects for the generation. Their technology-mediated experience not only influences their cognitive process at a place, but also the process involves in the creation of one's emotional bond to the environment (Mohd et al., 2019). As the major subject for their online communication through Instagram, physical setting may play a crucial role in the formation of sense of place to urban public space among the other elements of a place. In addition, this finding from the user-generated content is consistent with Amsden et al. (2010), who utilized a participant-generated image (PGI) approach to understanding the creation and maintenance of sense of place. The research found that the majority of photographs collected from participants asked to share images or stories of important places in their local community had depicted the physical environment of their immediate environment. Through in-depth interviews, Amsden et al. (2010) revealed that the community considered *visual beauty* in the site as the most important factor in the collection of photographs. What can be inferred from the both literature and the findings from the user-generated photographs on Instagram is that people may tend to describe desirable traits or ideal physical features when they share their experience via visual medium such as photographs. This may imply that a *commodified relationship,* one of the relationships of people to a place (Cross, 2001), can be distinct on visual social media applications rather than the other types of relationship such as *biographical, spiritual, narrative,* or *dependent* relationship.

The findings of this study show that most *physical setting* pictures belonged to one of two subcategories—*inside* and *surrounding.* These visual aspects, in and around the

squares, including movable benches, creatively illuminated trees at night, seasonal flowers in gardens, shade under trees, a central lawn or the façade of an iconic building nearby such as the New York Public Library at Bryant Park, have dominated users' perceptions in most urban squares. Art installations, mostly historical statues or site-specific public art, such as the Mohandas Gandhi Statue in Union Square or temporary art installations by commissioned contemporary artists in Madison Square Park, were also captured frequently in people's photographs. Even though the number of each type of photograph appears to vary across the three urban squares, people tend to present the physical, including both natural and built, attributes of the urban square and the surrounding area, such as the streetscape or adjacent architecture, on their Instagram profile. In other words, since many people consciously or unconsciously take and share photos of physical attributes of urban squares all year round, these attributes become especially salient in the creation of each urban square's sense of place on Instagram. These findings are supported by the Project for Public Space (2005), which asserts that the identity of an urban square is closely related to well-known nearby architecture as well as its key physical elements, such as statues or fountains. In addition, Art installations, mostly historical statues or site-specific public art, such as the Mohandas Gandhi Statue in Union Square or temporary art installations by commissioned contemporary artists in Madison Square Park, were also captured frequently in Instagram user's photographs.

As another crucial element in the formation of sense of place, human activity comprised about one-third of people's immediate perceptions. The finding reveals that the photograph of activity is the next most common image type in the urban squares after physical setting. Although the distribution varied throughout the year in comparison to the physical aspects of the urban squares, highlighting urban squares as a symbol of urban

culture and lifestyle; the majority of activity photographs in the three urban squares presented either cultural or recreational activities.

The findings as a whole showed a much higher proportion of *events & cultural activities*, such as public markets, political activism and music concerts, than *sports & recreational activities* across all three urban squares. This could be influenced by location and typology (Gehl Institute, 2017) of the squares, or by the urban context of the research sites, surrounded by commercial districts which determines the behavior patterns of public life for a particular square. Another notable finding in the *activity* category is that the presence of *food* in user photographs. This finding can be due to the fact that food is the one of top interests of Instagram users (Sehl, 2021), or it can be inferred that people may consider food as a part of important experience in a place. This finding is supported by the notion that accessible food is one of the most important requirements for a square to become a *place* (Lang & Marshall, 2017). Similarly, Whyte (1980) sees food, which helps bring more people to a place and encourages people to stay longer, as a crucial element of an urban public space becoming a place. These findings reveal the key elements of UGC among various types of interaction in the urban squares.

As the meaning of *place* is "often situated in the relationship between self, others and/or environment" (Gustafson, 2001, p. 9), the portraits people share via their Instagram profile, both of themselves or with others, could give valuable insight into how individuals create meaning in urban public spaces. The findings showed that portraits formed a sizable and important segment of the images of urban public spaces on Instagram. The finding is supported by many researchers (Stvilia & Jörgensen, 2009; Hu et al., 2014; Bakhshi et al., 2014) who describe photographs of people as the dominant type of image content on online photo-sharing communities, the consistent pattern is observed in users' photographs geo-referenced to the urban squares. This is supported by a study completed

by Hodson and Petersen (2018), who revealed that people use Instagram as a digital photo album to store and share their experiences and special moments with their friends and family members. In addition, the *documentiveness* category, which comprises the largest portion of user hashtags, is the only type of hashtag to show a significant association with the *portrait* category. This finding is consistent with research by Sheldon, Rauschnabel, Antony and Car (2017) that identified documentation as one of the primary motivations for Instagram usage. The user photographs here, particularly the portraits, and the hashtags attached to the images have informed how people consume and remember their experience in urban public spaces. The photographs classified as *portrait* could also provide valuable insight into the meanings and values of urban space in relation to *self* and *others*, the factors can influence the formation of the different levels of *place identity* (Gustafson, 2001) on this photo-sharing social media platform.

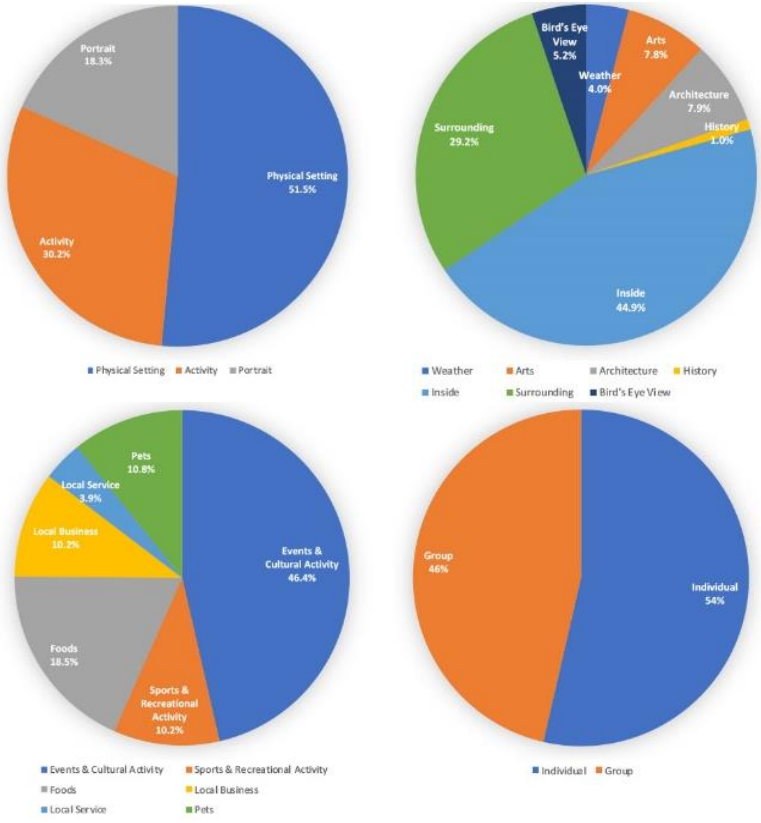

Figure 5.1 Observed distribution of user-taken photograph type by subcategory

In terms of how users attach hashtags to their immediate perceptions in urban public space captured through their image content, the findings reveal that the three most frequently occurring types of hashtag, *documentiveness*, *content-relatedness*, and *city-relatedness*, occur at a much higher rate than the other two types, *emotiveness* and *performativeness.* However, the latter two types of hashtags, statistically, did not show significant associations to most of the photo types or seasonal changes in the three urban squares. It also appears that hashtag usage can vary based on the type of user photograph, which can be influenced by the physical and social attributes of public spaces. For instance, people tend to add more the tags of *city-relatedness* to the photographs of physical attribute than that of human-activity; the photographs of *architecture* showed the largest portion of the tags, followed by of history, surrounding, bird's eye view.

Particularly, the content-related tag revealed a significant association to the variables of each research site and the twelve months; the users' hashtags on Instagram could be utilized to examine what experiences or perceptions people commonly recognized from urban public space. This finding could be explained by the way people utilize image tagging to inscribe the information associated with their pictures in "*literature code"* (Collier & Collier, 1987, p.10) and which types of information are described through tags. The tags are most often regarding the subjects depicted in the images or contextualized information such as location and time of their photographs. This result is supported by research completed by Sheldon and Bryant (2016), who highlighted documentation as a crucial motive of Instagram usage.

The hashtag patterns on the user photographs geo-referenced to urban squares provide important information on the characteristics in understanding sense of place presented on a visual social media platform, as opposed to a text-based platform. Most of the previous studies of sense of place that utilized user-generated tags have analyzed tags

based on frequency; in contrast, users' hashtags associated with their photographs provide valuable insight into how people define, select, and share the cultural and physical attributes of urban space. Sense of place is the result of the set of interactions between settings and personal and psychological aspects that can be shaped or selectively captured through reflecting characteristics of a certain medium—in this case, a photo-sharing platform such as Instagram. This insight can serve as a guide to users' underlying motivations and purposes for sharing content on their Instagram profiles.

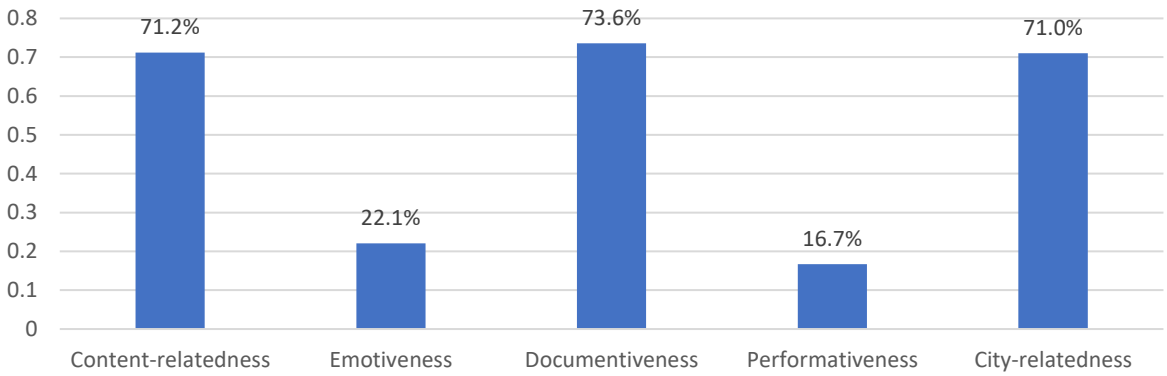

Figure 5.2 Observed hashtag usage in urban squares by hashtag type.

Hashtags have proven their popularity and effectiveness in increasing searchability for their associated content across various social media platforms, and commercial hashtags are considered an important typological feature in public spaces in the literature (Heyd & Puschmann, 2017). However, hashtags designed specifically to promote their associated content, here termed *performativeness* or professionalized hashtags, showed the least usage among the sampled user content in public squares. Such a relatively low frequency could be explained by such hashtags in public spaces being most commonly associated with commercial profiles such as local shops, travel marketing agencies, or commercial photographers, which were excluded from this study. What can be inferred from the finding is that users did not have a strong intention to attract general Instagram users to their content geotagged on public spaces, but rather to store and share their

experiences and significant moments in public spaces within their own networks of users, such as family members or friends. Yet, it should be noted that this does not necessarily mean people do not want to share with the general Instagram public, as all photos in the dataset were made publicly accessible in real time.

5.2 Emotional Representation via UGC in Urban Squares

> **Sub-question 1-1(RQ1-1) :**
> *A set of feelings through the interactions between settings and personal and psychological aspects is an important factor in understanding the sense of place, and user-generated data including hashtags on social media has or can have a critical role in providing such information. What emotional value is contained in hashtags associated with user photographs of urban public spaces?*

According to previous studies, hashtags are often utilized as a method of emotional expression—associating emotive words with the image to describe users' feelings (Ye et al., 2018; Baranovic, 2013). However, for the geo-referenced photographs in urban public spaces, it is evident that people rarely utilize hashtags for this purpose. Only a small amount of the user-generated content (UGC) examined in this study involved hashtags of *emotiveness*, in comparison to the three most observed hashtag types of *content-relatedness*, *documentiveness*, and *city-relatedness*. Even those emotional hashtags that were observed are concentrated in positive emotionality, a tendency that appears consistent across all the urban squares in this study. Despite the lower rate of emotional tags on UGC, the tendency of user photographs toward positive hashtags could be also be explained by essential motives for social media activities, such as *relationships* or *self-presentation* (House et al., 2004). One important motivation of social media is interpersonal use (Heyd & Puschmann, 2017) as a way of connecting with existing relationships. While traditional photo-sharing served largely to maintain existing relationships, people also use their social media profiles to create new social relationships. As a way of managing others' impression of oneself, images on one's profile serve an

important role in creating an online identity. It could influence the selection of their contents and lead to the absence of negative experience or hashtags. Also, the use of social media for self-expression is closely related to the notion of *ideal self*, which argues that people tend to promote an idealized image of themselves rather than their actual self in the digital world (Back et al., 2010). As part of effort to manage self-identity, people traditionally utilize physical possessions or objects to impart salient signs of their identity to others (Belk, 2016). This tendency could emphasize an individual's *ideological* and *commodified* relationships (Cross, 2001) to a place for online presentation. This may imply that well-articulated content depicting desirable features or ideological physical attributes of a specific urban space is likely to be featured on one's profile in order to impress others. Yet, it is important to note that the presence and absence of negative users' contents can differ in different types of urban space or surrounding circumstances; the finding cannot be generalized beyond that particular type and context of urban public space for this study.

In order to identify the potential of hashtags on user photographs to help understand the sentimental quality of user experiences in public spaces, this study employed two criteria for evaluating emotional values attached to urban public space presented through UGC: eight affective qualities of place developed by Russell and Pratt (1980) and three levels of sentiment: *positive, neutral,* and *negative*. As mentioned above, the majority of user photographs did not contain any emotional tags; those UGC were classified as having neutral sentiment. This result is consistent with H. Kim et al.'s (2017) research on the High Line in New York City, which used text-mining techniques on visitor tweets and found that most of the tweets studied were of *neutral* sentiment, while those containing emotional words tended to be *positive*. Furthermore, among the top ten most common hashtags extracted from the High Line tweets, they identified only one

emotive hashtag, #love. Even this is often considered a meaningless hashtag, a *stophashtag* (Giannoulakis & Tsapatsoulis, 2016) or *stopword* (Armano et al., 2015). From this, it can be inferred that hashtags assigned by the general public in urban spaces are unlikely to carry users' emotional expressions, although many studies have highlighted a strong correlation between the sentiment in UGC and emotional attitudes toward certain issues (Mattson et al., 2013; Luong & Houston, 2015; Xiang et al., 2017; Sheldon et al., 2017). This may imply differences in motivations or patterns of usage between general text-based content and hashtag.

Based on the low usage rate, the results of this study for the relationship between two sets of emotional variables and most of the photograph categories revealed no significant relationship, with the exception of *activity*. *Activity* was the only image type to show a close relationship to emotional aspects of user perception in urban public space, despite its lower usage rate among the content. The significant association between *emotiveness* hashtags and pictures of *activity* is consistent with the existing literature (J. Kim et al., 2019), which utilized data from two major platforms, Google and Instagram, to identify the close relation between human activities and satisfaction factors in urban parks. In addition, the subcategories of *activity* indicated statistically significant relation to *pleasant*, one of the eight affective qualities of place, and three levels of sentiment. In particular, users' photographs of *events and cultural activities* showed the highest number of these positive expressions, followed by those of *foods* and *pets*. This finding of the study is also supported by Mehta (2013), who describes that social interactions in public space provide "pleasing sensory experiences and [have] positive symbolic associations for its users" (p. 117). This observed emotional expression associated with human activity in urban public space can guide an understanding of the cognitive and affective experience between people and their environment. User photographs of sociocultural activities with

attached emotional tags presented through UGC on Instagram could provide valuable insight into the affective experience which culturally shared on Instagram (Ujang et al., 2018) to a particular urban square.

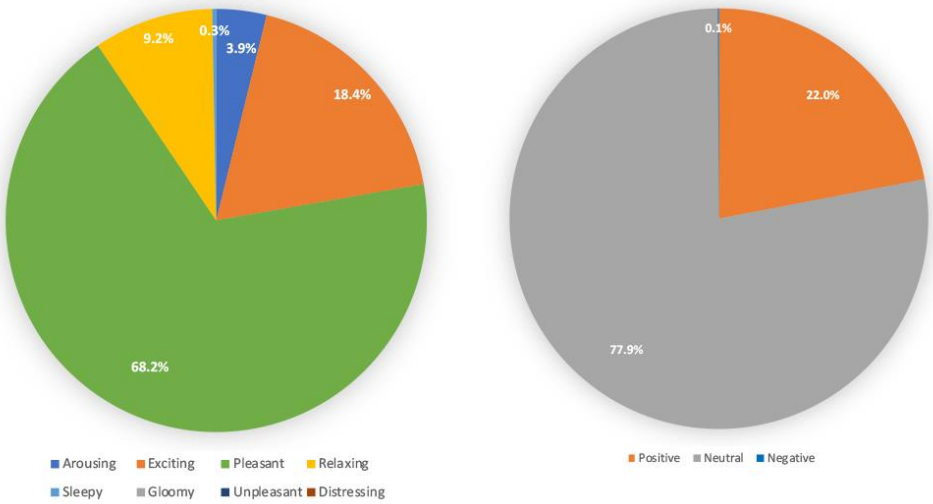

Figure 5.3 Observed distribution of *emotiveness* hashtags by the eight affective qualities of place vs. the three levels of sentiment.

However, the relatively low usage of hashtags for emotional expression does not necessarily mean that the user-generated contents of this study are tangential to an individual's emotional attachment to the urban public spaces. Given the significance of technological engagement on the formation of personal bond to a specific place (Mohd, 2019), the constant sharing and labeling their real-time experience for self-representation online itself is evidence to support the existence of one's emotional connection to the environment. Through the technological engagement in urban public space, individuals can construct their own space with the interplay of subjective understandings of the specific place; this process may have an influence over the development of one's place attachment. In addition, Millennials can gain a strong emotional connection with a place through participating in the co-creation experience online (Mohd, 2019).

5.3 The Role of UGC in the Image of the City

Sub-question 1-2 (RQ1-2) :
Historically, people's perceptions of the urban public space have been closely related to the urban identity of the city. People's perceptions have added user-generated content, as the society has opened itself to the online platforms. This user-generated content is interconnected with the urban public spaces and also the city itself through the users' hashtags. How does user-generated content of urban public spaces on social media contribute to the image of the city?

It is evident that users' photo content published in urban squares is closely tied to the formation of urban identity on the photo-sharing social media platform Instagram. As shown in Figure 5.2, the majority of the sample data contained city-related hashtags, showing significant associations to all subcategories: *city name*, *other place*, and *compound word*. This finding implies that an individual, either consciously or unconsciously, recognizes their experience in a particular urban square in relation to the city in which the square is located. The subcategories of *city-relatedness* hashtags were seen to be used at different rates; *city name* hashtags, such as #newyorkcity, #newyork, or #nyc, show the highest usage rate, while the other two types of city-related hashtags, *other place* and *compound word* were used much less frequently.

Photographs of users' experience, as a whole sample of UGC, in the urban square will be revealed when people search for hashtags of the city name, nearby locations, or compound words made from the city name; in turn, these user photographs, along with their hashtags, ultimately contribute to the formation of urban identity on the photo-sharing social media platform Instagram. This finding is supported by Bekar's (2018) idea that a collective individual impression of urban spaces is a crucial element in establishing a city's image; it further confirms that urban squares help shape the character and identity of the entire city (Lang & Marshall, 2017; PPS, 2005), even in the digital environment. This conclusion corresponds with existing literature that shows that the collection of

perceptions and interactions by a city's residents and community through eWOM, including user-generated content, directly influences its sense of urban spaces, which contributes to an overall picture of the city today (Kavaratzis, 2004).

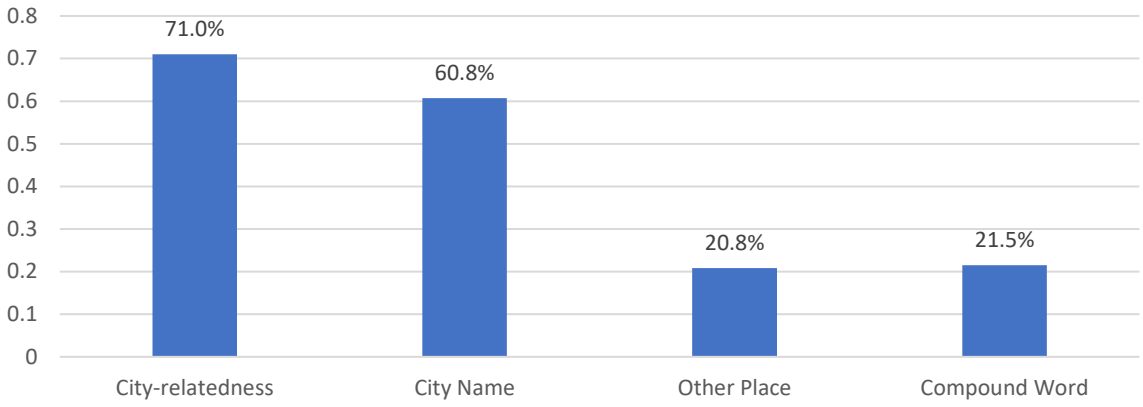

Figure 5.4 Observed city-related hashtag usage by subcategory of city-relatedness.

Specifically, the physical aspects of the urban square are the key element in the creation of sense of place on Instagram. User photographs of *physical setting* comprised the largest portion of the *city-relatedness* hashtags in the research sites. Among the pictures of physical attributes of urban squares with hashtags of *city-relatedness*, people uploaded images of *inside* and *surroundings* most, based on the number of photographs for the categories. One interesting finding is that the largest ratio of photographs assigned *city-relatedness* hashtags were of *surroundings* as compared to other *physical setting* subcategories, including *inside*, which occupied the largest portion of the sampled UGC from the urban squares. This result indicates that people recognize adjacent regions and scenery, as well as experiences along a particular urban square, as a key part of their perceptions of the square. This implies that those interconnected perceptions reflect the broader urban context around the square and recalls research by Lang and Marshall (2017), which emphasized positive sequential experience across urban squares as one of the requirements for a square to become a *place*. Similarly, all three subcategories of

photo, *physical setting*, *activity*, and *portrait*, had statistically significant associations to hashtags of *other place*, a subcategory of *city-relatedness* tag. The large number of user photographs with *other place* tags indicated that people associate their experiences and memories in urban public spaces with certain landmarks in the city, such as famous buildings, other parks, attractions, or features near a particular square or in the city. This finding corresponds with existing literature that finds the identity of squares is closely tied to nearby civic buildings and important features in the city (PPS, 2005; Kim et at., 2017). It can be inferred that photos of the physical environment in urban squares are more likely to be associated with the other elements of the image of the city on social media, thus serving as crucial linkages in the city's network of urban open spaces.

Although they occurred at a lower rate in comparison to the physical aspects of urban public space, people's images of *activities* at the urban squares are also closely related to the creation of urban identity on Instagram. Particularly, people's images of *events & cultural activities* contained the largest number of city-related tags among the subcategories of *activity* photographs, revealing them as a key element in the formation of sense of place around this symbolic type of public space, the urban square. Another important finding is that the subcategories of *portrait* showed significant association to hashtags of *compound word*, while the other two subcategories of photo, *physical setting*, and *activity*, had no statistically significant relationships to the *compound word* category. What can be derived from this finding is that people tend to add hashtags for more pragmatic uses such as expressing their feelings or making comments on either selfies or photos with their friends or family. This finding is supported by Caleffi's (2015) work, which purports that hashtags made up of combinations of multiple words offer more potential for creative use than one-word type hashtags.

Overall, there is compelling evidence that UGC in urban public spaces does have an impact on urban identity in the digital world. The findings also reveal that people perceive their experience in urban public squares in relation to the image of the city. Furthermore, the results of the analysis about *other place* tags provide clear evidence that urban squares act as the center in the recognition of a particular city. Thus, it is plausible that a collective perception from UGC in urban squares helps shape and contribute to the identity of the entire city with strong "imageability" (Lynch, 1960, p. 9) as *nodes* not only in the real world but also in the digital environment. It should be noted that although this study utilized city-related tags to identify the immediate relationship of UGC to the image of the city, the users' cognitive and affective aspects attached to the UGC need to be considered together, as a *city image* is formed on "an interrelated system of perceptual and emotional components" (Folgado-Renandez et al., 2015, p. 78) of people. As electronic word of mouth (eWOM) of people plays a crucial role in the communication of the image of a particular urban space and even an entire city on the Internet (Kavaratzis, 2004), a comprehensive approach to UGC needs to be taken in understanding the image of the city on social media platforms.

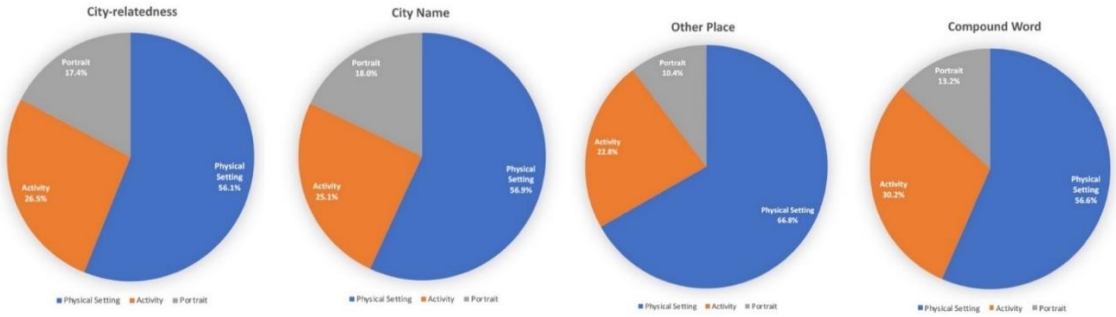

Figure 5.5 Observed distribution of city-related hashtags for photograph type.

5.4 Distinctiveness of Urban Squares

Research question 2 (RQ2) :
Place identity is the fundamental factor of sense of place that allows a place to differentiate itself from other public places. Does the user content of shared images and hashtags on Instagram reflect the distinctiveness of urban public spaces and if so, how?

It is evident that user perceptions shared in urban squares reflect the distinctiveness of each urban square by showing differences in the proportion of photographs taken in various categories. As this study considers the reoccurrence of shared experiences in urban space as a crucial factor (Williams & Stewart, 1998) in the formation of a sense of place on Instagram, the accumulation of certain types of users' perceptions through the visual evidence of UGC can be seen as an important factor in the formation of a collective sense of place on the digital environment. In spite of the vulnerability and less authentic nature of user's online content than tangible equivalents (Belk, 2016), a collective user's real-time perception in urban public space, through electronic word of mouth (eWOM), could provide meaningful insight with a high level of credibility (Kavaratzis, 2004). The technology mediated experience has proven its influence not only in users' perception of on-site and also reveal uniqueness of a place (Mohd et al., 2018). As Instagram is largely dominated by Millennials (Per Research Center, 2019), the impact of their technological engagement and their addiction to virtual connectivity must be considered in understanding their collective image of place on Instagram.

As mentioned in the previous section, the results of this study reveal that physical features of urban public space are among the most important components of the formation of sense of place on Instagram, while a different type of photograph was relatively emphasized at each urban square: *physical setting* at Madison Square Park, *activity* at Union Square, and *portrait* at Bryant Park. Particularly, in the case of Union Square,

activity showed about the same importance as physical attributes. In contrast to the distinct patterns of users' photo contents, no difference was discovered in the hashtag behavior of people in the various squares.

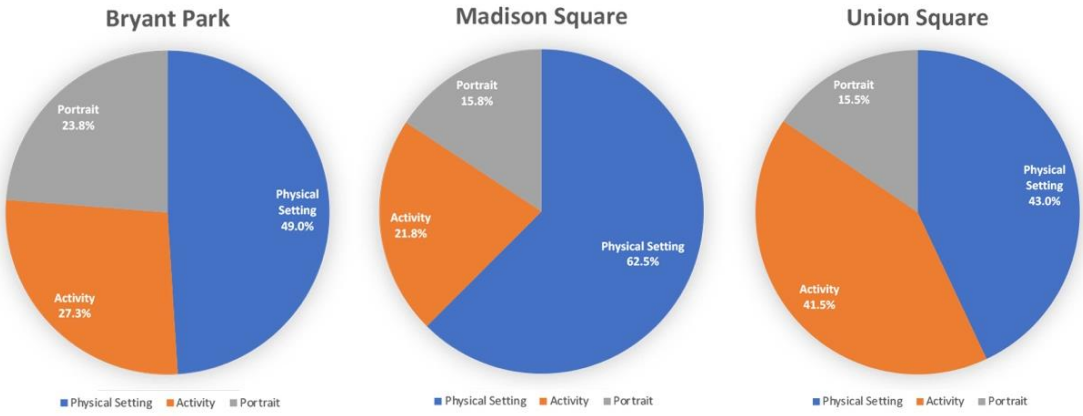

Figure 5.6 Observed distribution of UGC by photograph type.

In the case of Bryant Park, photographs of *sports & recreational activities* represented the highest portion among the research sites. In addition, Bryant Park saw the largest portion of user-generated photos shared in winter. From these findings, it can be inferred that the Winter Village programs, which include skating, serve as the most recognizable experience in Bryant Park by Instagram users. As the preference for recreational activities can be varied by personal factors such as gender, age, or nationality (Zhang & Gobster, 1998), the distinct series of programs in Bryant Park should be considered in relation to user demographic of Instagram. Another notable type of user photograph is *portrait*, in both *individual* and *group* types; people shared larger numbers of *portraits* in Bryant Park than in either Madison Square Park or Union Square. The photographs of *portrait* in urban public space often feature panoramic views of the urban squares that form an ideal backdrop for pictures of the self (Gretzel, 2017) or other people in the portraits. With the visual evidence of UGC, the content of physical features and experiences in Bryant Park appear more significant than in the other research sites as

background elements to elevate the self-presented in the foreground, as a part of *the extended self*.

As seen in Figure 5.6, the *physical setting* of Madison Square Park was the most recognized subject in the user content taken in this public square. Within this category, images of *inside* and *architecture* were the crucial elements. Users' images show that nearby landmarks—including the Empire State Building and Madison Square Garden, as well as year-round programs offered by Madison Square Park Conservancy (MSPC) like *Mad. Sq. Hort* and *Mad. Sq. Dogs*—are what differentiate Madison Square Park from the other urban squares. The finding also reaffirmed the reputation of Madison Square Park as one of the best dog parks in New York City (www.madisonsquarepark.org), as a significant number of photos were pictures of pets in the square; the number of user photographs from this square with pets was about five times that of Bryant Park and six times that of Union Square. Contrary to the notable presence of horticultural programs and people's pets in Madison Square Park in the UGC, the proportion of images showing food appeared relatively consistent among the research sites. This is despite MSPC's dedication to providing various food options to their visitors; one of the park's featured programs, *Mad. Sq. Food*, has invited local restaurants, such as Shake Shack, a well-known American fast casual restaurant, and hosted several culinary events throughout the year.

In Union Square, it is evident that *activity* is the most salient subject in the UGC on Instagram. The number of *activity* photographs in Union Square neared that of *physical setting*, which scored the largest numbers of UGC in all research sites; pictures of *events & cultural activity*, in particular, were revealed as the predominant type of user photograph among all activity subcategories in Union Square. This is about twice the number of *inside* and *surroundings*, which present the largest image types in the overall dataset for this study. From these findings, it can be implied that people conceive of Union

Square as a major center for *events and cultural activities* throughout the year, both on-site and in the digital environment. Union Square has served as a location for many socio-cultural actions, including the first-ever Labor Day parade and several social protests for human rights. In addition, a variety of ongoing events and cultural programs that aim to improve the daily life of its community and visitors, such as Union Square Greenmarket in fall, are crucial elements in the formation of sense of place on Instagram.

Another interesting result appears in the UGC from Union Square in relation to two image types: *bird's-eye view* and *local business*. The number of *bird's-eye view* photographs of Union Square is about four times that of Bryant Park and Madison Square Park; a similar pattern was observed for *local businesses* through photos geo-referenced to Union Square. These findings imply that people who visit Union Square also recognize their experience of the surrounding districts as part of their perception of Union Square. They may also imply a distinct relationship with Union Square among people who live in, work in, or visit the surrounding buildings and the neighborhood of the square. These findings can be explained by the efforts of Union Square Partnership (USP), such as the Neighborhood Visioning and Planning initiative, which seeks to improve and maximize the quality of life both in the square and in the 14th Street district (Marvel Architects, 2019).

The collection of the distinct characteristics of each urban square through the large numbers of subjective perceptions were reflected on the photo-sharing platform with statistical significance across all types of photographs: *all photographs*, *physical setting*, *activity*, and *portrait*. As the recurrence of experience, or the repetition of activities at a location by a person or group, has been emphasized as an essential principle of place (Brandenburg & Carroll, 1995; Williams & Stewart, 1998), the number of repeated images on Instagram for various experience types shared in each urban square can help in

understanding the creation of an online sense of place. These findings are consistent with findings from the literature that urban squares are associated with individuals' perceptions through the physical features, artifacts or cultural events (Lang & Marshall, 2017) that differentiate one square from another.

As the preference for recreational activities can be varied by personal factors such as gender, age, or nationality (Zhang & Gobster, 1998), the distinct series of programs in Bryant Park should be considered in relation to user demographic of Instagram. The subjective users' perception in urban squares projected through the UGC are, in procedural aspects, similar to the formulation of *place identity* in Marzano's view (2016), which is a goal-oriented concept shaped by certain stakeholders. In the aspect of content, the collective perceptions of urban public space on Instagram could reflect user's various motivations or purposes such as documenting their important life events, communicating with people, or crafting their ideal self-identity on Instagram (Sheldon et al., 2017). Particularly, the distinct characteristics and experiences of the research sites were selected, orchestrated, and presented by each user to create their *virtual identity.* As the effort for self-promotion is observed across all age groups (Doster, 2013), it can be inferred that the users' content on Instagram could reflect one's ideal or most desirable features in their environment. In terms of type of relationships people have with a place (Cross, 2001), the aspects of *commodified* and *ideological* relationships could be more visible with the underlying intention. In addition, it should be noted that an individual's ideal image of place can change across the course of time and one's life stages (Hay, 1998).

Contrary to the observed differences in photograph types as seen in Figure 5.6, the findings indicate a very similar distribution of hashtag types among the three squares as shown in Figure 5.7. These findings indicate that the distinctive characteristics of a particular square can be observed through users' images on Instagram rather than through

hashtags. One possible implication is that no type of experience or physical characteristic of an urban square may influence the usage of hashtags on users' photographs. These findings might suggest a certain tendency of hashtag usage in urban public space on Instagram independent of people's experiences; the findings reveal that associations with the research sites can be found between place and three hashtag types: *content-relatedness, city name,* and *other place*. Users' hashtags on their associated images offer a certain consistency in indexing the subject matter of the photographs; it may show that the hashtags on the visual social media platform can be helpful in identifying features or activities recognized by the users. The findings of *city name* and *other place* hashtag types on the UGC also identify the crucial relationship of the urban square to the city in which it is located and to nearby locations in the city. As the large presence of photographs were depicting surrounding context of each research site, the hashtags of city name and nearby locations may provide individuals with an expanded perception of a specific place to nearby area or to its city.

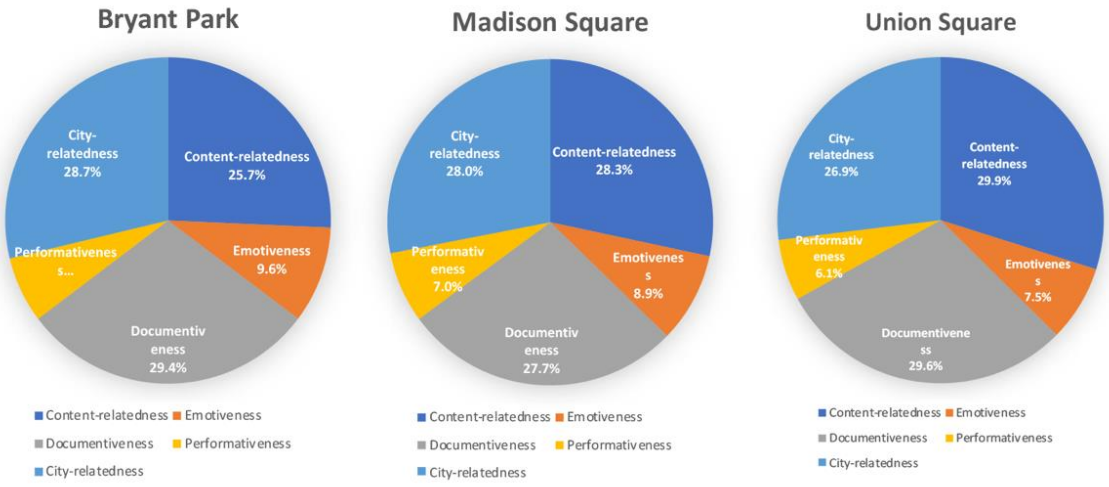

Figure 5.7 Observed Distribution of UGC by Hashtag Type

5.5 Seasonal and Monthly Changes

Sub-question 2-1 (RQ2-1) :
The concept of place changes through time and the interaction of itself to it. The perceptions of seasonal changes are of central aspect in determining the sense of place. How does the user content of shared images and hashtags on Instagram reflect seasonal changes in urban public spaces?

The findings reveal that the distinctive characteristics of each public space, discussed in the previous section, are clearly evident in the seasonal and monthly changes, which show statistically significant associations between *place* and both variables *season* and *month*. It was shown that people's perceptions of the three research sites, Bryant Park, Madison Square Park, and Union Square, change according to the seasons; this finding is supported by research completed by Lang and Marshall (2017), who argued that patterns of human behavior in urban squares are affected by the season and time of year. Even more visible differences are observed in monthly distribution throughout the three research sites; this finding shows statistically significant associations between *month* and all three types of photograph, *physical setting*, *activity*, and *portrait*, while the associations between *season* and *physical setting* and *activity* were less significant, and no significant association was shown between *season* and *portrait*. What can be inferred from these findings is that any time period, a "temporal boundary" (Le Compte, 1974, p. 184) such as months or seasons, introduced in the data sampling or analysis process can influence the results of the study. These findings imply not only that the time frame of data publication, such as a month, a season or year, can affect the creation of the image of urban public space when dealing with UGC, but also that the time intervals used in data analysis can influence the interpretation sense of place for a particular urban public space.

In the case of Bryant Park, although Bryant Park Corporation (BPC) offers various programs throughout the year, the largest portion of user-generated photos of the square

were shared in winter. This phenomenon is not limited to the *activity* photograph type; rather, it can be observed across all types of users' images, including *physical setting* and *portrait.* Specifically, as shown in Figure 4.6.2, visitors to Bryant Park shared the highest number of experiences in the month of December as the offered variety programs for the holiday season. Likewise, the much higher incidence in the winter of *sports & recreational activity* photos in Bryant Park than in either Madison Square Park or Union Square also supports the popularity of programs in December in Bryant Park.

. On the other hand, the amount of UGC in February, which is in winter, is the third lowest number; from this, it can be inferred that the time interval used for data analysis plays a crucial factor in interpreting collected data from Instagram.

In contrast to the other two squares, the distribution of people's photographs in Madison Square Park was relatively evenly spread across the four seasons. This can perhaps be explained by Madison Square Park having the largest portion of *physical setting* photographs among the research sites; this type of photograph tends not to be influenced by seasonal changes as *activity* photographs are. Specifically, the three highest numbers of UGC were found in April, June, and October; this distribution of the three highest-scoring months across three different seasons reflects the even distribution of UGC across the four seasons.

Given the largest portion of *physical setting* content, specifically photographs of *inside*, what can be inferred from these finding is that visitors to Madison Square Park tend to capture the interior of the square, including various curated plant collections from the park's unique horticulture-related programming such as Global Gardens and Meet the Trees, in all seasons. In addition, another finding to highlight in the *activity* category in Madison Square Park is the photographs of *pets*; although the number of images depicting *pets* is relatively small among all types of photographs in Madison Square Park, this

square features the highest number of *pet* photos among the research sites. The findings also revealed that the largest portions of pet images were posted in spring and fall, as expected since this is when pleasant weather predominates and programs for pets are more likely to be held.

In the case of Union Square, the findings reveal the distinct features of UGC in both time-related variables, *season* and *month*. As *activity* images serve as the predominant content in Union Square, this category saw its largest numbers in fall, about twice that of Bryant Park during the same period. Similarly, the month of November, in fall, shows the largest portion of *activity* photographs followed by October. These two months are when Union Square's iconic seasonal programs are held, including *Harvest in the Square*. In contrast to *physical setting* photographs, the proportion of *activity* photographs is directly related to the seasonal distribution of user content. What can be inferred from these findings is that the time frame and intervals of data collection and analysis process are crucial factors in understanding public spaces that offer large numbers of events and sociocultural activities. Therefore, when studying urban public space, it is necessary to consider both a sufficiently long time period and appropriate time intervals in order to gain a comprehensive view of *sense of place*.

5.6 Summary

This chapter discussed the research results for exploring people's immediate perception in three urban squares, Bryant Park, Madison Square Park, and Union Square, in New York City on the photo-sharing social media platform Instagram, in order to complement the existing body of sense of place literature which utilizes user-generated content (UGC). This study also discussed the nature of the collective sense of place created through the image-based user content with its associated hashtags available on Instagram.

The main finding of this research is that those who visited urban squares tended to capture and share, through their geo-referenced contents, physical attributes most. This tendency is particularly evident in the case of Madison Square Park, in which UGC is spread evenly across four seasons. The distinct characteristics of each square were reflected in the subjective vision of people through their image content. Also, this research found that although positive sentimental expression was associated with the UGC across the research sites, this might not correspond with sentimental qualities observed in the squares, except when connected to the specific activities captured in the UGC. This finding revealed a significant connection of users' content on Instagram to the image of the city online. People's experiences shared on Instagram were further analyzed, and a distinct identity of each urban square was identified by examining seasonal and monthly changes in relation to current programs offered at the sites. The conclusion and implications of these findings will be described in the next chapter.

CHAPTER SIX: CONCLUSION

Introduction

This study used quantitative content analysis of user-generated content (UGC) in urban public space to understand a collective sense of place on the visual social media platform Instagram. More specifically, this research focused on the immediate perceptions of users, captured through geo-referenced photographs and their associated hashtags, in three urban public squares, Bryant Park, Madison Square Park, and Union Square in New York City. The findings from the set of research questions identified the configuration and characteristics of people's immediate perceptions projected on Instagram. The findings provide academic and practical implications as an interconnected subset of the overall sense of place for urban public space in the digital sphere. This chapter summarizes the key findings, describes the limitations of the study and examines implications for scholarship and practice. The final section suggests future studies that emerge from these findings and their limitations.

6.1 Summary of key findings

Public space in a city, particularly urban squares, has traditionally reflected sociocultural aspects of urban life and embodies a shared sense of community in the city. The findings of this study show that this remains true even in the digital environment, particularly in the photo-sharing social media application Instagram. People's collective immediate perceptions shared in urban squares on Instagram indicate a distinct pattern in the distribution of photograph types and hashtag usage from those on other social media platforms (e.g. Twitter or Facebook) and user types (e.g. commercial or organizational profiles). The information extracted from the UGC in urban public space can support a

better understanding of people's spatiotemporal experiences and the ever-changing process through which sense of place for urban public space is formed in the virtual world.

1) The findings of this research suggest that physical attributes of urban squares are the most dominant perception of geo-referenced pictures on Instagram. Even though the number of each type of photograph appears to vary across the three urban squares, people tend to present the physical, natural or built, attributes of the urban square and the surrounding area, including streetscape, on their Instagram profile. The findings of this study and the existing literature using Participant-Generated Image method (Amsden et al., 2010) imply that people tend to capture and highlight ideal or desirable traits of their environment through photographs. These can be understood through the *extended self*-approach. UGC in urban public space can not only contribute to the development of sense of place on Instagram, but also utilize in the creation of one's *virtual identity* in the digital environment.
2) People's immediate perceptions shared in urban squares vary with time and place, as squares change their appearance throughout the course of a year. The findings suggest that perceptions of an individual in the urban square reflect the distinctiveness of that square, including physical features, artifacts or seasonal cultural events held there (Lang & Marshall, 2017). With the strong technological engagement and "addiction to connectivity" (Mohd et al, 2019, p. 129), the key user group Millennial constantly may share real-time experience in a place. The technology mediated experience may help to capture the uniqueness of a place over the course of time. In addition, the findings reveal that the time frame of content publication or the time intervals used in data analysis can affect the interpretation of user-generated content. This

implies that the users' collective experience as presented through imagery content on Instagram could well reflect the distinct characteristics of urban public space and changes over time.

3) On the other hand, the patterns of hashtag usage found in this study show no difference across the three urban squares. It seems that the physical and social attributes of each urban square did not affect the hashtag usage for the geo-referenced photos on Instagram. This implies that there could be a certain pattern in the use of hashtags in urban public spaces, regardless of any unique characteristics of a particular place. In general, people tend to use tags to contextualize and document the special moments captured in their photos. The patterns found here align with Isabelle's (2018) argument that people utilize Instagram as a virtual photo album. By indexing certain meanings or feelings on site experience, people could develop their own cognitive and affective values towards the environment (Mohd et al., 2019). The constant technology-mediated experience may ultimately lead to strong psychological attachment to the environment.

4) The sentimental quality of people's experience in urban public space should not be judged on emotional hashtags on user content on Instagram with the exception of photos of *activity*. In addition, the significant relationship between the emotional states and *activity* experience in a place should be interpreted in relation to user's demographical factors of targeted social media application, particularly *age*. In addition, people do not actively use hashtags for practical, meta-communicative purposes, such as to increase the visibility of their content on social media. It seems, rather, that people share within their circle of acquaintances and have less intent to reach strangers on Instagram; however,

due to the openness and accessibility of the content, we cannot infer that people do not want to share their experiences with the public. It should be noted that this study utilized content from ordinary people; the hashtag utilization of other parties such as local businesses or local organizations could differ significantly in relation to user's motivations or purposes of a particular social media application.

5) Finally, the findings show a clear connection between hashtags associated with users' photo content and the image of the city. This strong association found between photo content and city-related hashtags aligns with the well-established discussion on the role of the urban square in the formation of urban identity. A majority of users' geo-referenced content in urban squares contains tags that name the city, neighborhoods, or significant nearby buildings; it is apparent from the findings that the urban square is recognized as a *node* in the interconnected network of a city in the digital environment. It is important not only because users' subjective experience in urban public space emerge in conjunction with all the information relating to a city on the Internet, but also it may help in building online communities centered around a particular urban square on Instagram. People may unconsciously contribute to online communities in relation to a place; the communities can be formed at different scales, such as an urban square, its neighborhood, or even its city in which the square is located. In addition, the virtual connectivity and communication technology enable people to experience freely any place in the world. In the virtual environment, one type of community attachment, *relativity* (Cross,

2001), can be emphasized more than the other types of attachment, such as *biographical* or *spiritual* relationship to a place.

6.2 Limitations of the Study

The type of data sampling used may influence the study, in this case, the characteristics of Instagram and the interests and demographic features of its users. As discussed in Chapter 2, the nature of a particular social media platform can introduce potential problems such as platform biases, data availability biases, and data authenticity issues (Ruths & Pfeffer, 2014). Even though Instagram has played a central role among the photo-sharing social media communities, users' image contents from various photo-based social media platforms should be taken into consideration to generalize the findings of the study. In addition, the demographic characteristics of the unspecified users on Instagram can be covered from its residents to temporary visitors. As the subjective and interpretive nature of sense of place, the findings can significantly influence their various motivations or the intensity of the relationships to a place.

The location and type of research site used may influence the study. Due to the distinct context of the research sites, located in the center of commercial districts in New York City, and the specific criteria used to select these sites, including urban context, racial distribution, and the particular typology of urban space from Gehl Institute's (2017) Public Life Data Protocol, the results of this study cannot be generalized to urban squares or public spaces in general. For instance, surrounding contexts of urban square can affect physical or invisible factors including human activities within a particular square. In addition, UGC in different types of urban public space may produce different outcomes; for instance, the absence of negative user tags may differ considerably in memorial parks.

The time period/interval in data collection used may influence the study. As the findings of this study suggest differences between monthly and seasonal changes in people's immediate perceptions, the shape of a collective perception in urban public space can be varied in different time period or time interval for data collection. Therefore, the findings of this study can be applicable in the particular time frames that applied in this research. Similar to the type of research site, different time periods of data collection that coincides with events such as political or social protest may produce entirely different outcomes than that of the finding of this study; people's immediate perceptions on a particular occasion might mainly contain negative emotionality.

6.3 Research Implications

Based on the research findings, this section develops the following implications for practitioners and researchers. The implications of this study will be described in relation to the principles of creating a successful place proposed by the Project for Public Spaces (PPS).

Firstly, a successful public space should offer easy accessibility and visibility both up close and from a distance. Designers and planners of urban public squares must take a holistic view of squares along with their surrounding areas. One notable finding of the study is that people's perception of an urban square encompasses the streetscape, buildings, and local businesses adjacent to the square; the edges of a square and adjacent areas, as well as the pedestrian circulation pattern through the square, must be considered in order to provide a positive sequential experience. Entrances serve as thresholds, and their visual and physical aspects will play an important role in the overall perception of the place. In addition, the viewsheds of urban squares from and to adjacent streets and nearby buildings should also be taken into account in the design and development process.

Finally, the current urban context around a particular public space, including the street layout, transportation options, transit stops, and sidewalks, needs to be considered in creating an urban public space that will serve its neighborhood well.

The results of this study suggest that while the user-generated content (UGC) reflects people's use and perceptions of the urban squares throughout the year, what is reflected changes seasonally. As activity is central to making a place unique and thus giving people a reason to visit, many different types of activity for different ages, for individuals and groups, have been offered at various times of the day in an effort to create better places for people. As the Project for Public Spaces (2018) has recognized Web 2.0 social media as a critical tool for integrating diverse opinions into a cohesive vision of public space, UGC related to past events or programs may inform planning for future programs; UGC could be utilized as a significant resource in creating and managing seasonal programming in urban public space. However, the usefulness of UGC is not limited to providing feedback about activities; UGC could also be utilized to gather opinions on changes and improvements to the physical elements of the space. To interpret UGC about activities in a place, it should be noted that individuals' preferences for activities vary according to personal factors such as gender, age, religion and nationality, and the demographics of relevant social media applications should be considered in the interpretation of users' subjective perceptions. As millennials form the key user base of Instagram, the findings of this study should be interpreted in relation to the characteristics of this generation, yet we should consider the opportunities and possibilities created from their preferences in order to create successful and inclusive urban spaces for all generations.

Next, users' subjective experiences in urban squares are directly tied to the image of the city, even in the digital environment. This phenomenon may signal a paradigm shift

toward the consideration of this user-generated content as cities strategize to build sustainable and competitive images in the digital environment. Most people in the urban squares utilized various hashtags referring to the city, New York City in this particular study; thus, their content in the urban squares will emerge in searches for information on the city. This suggests the need for integrated strategies on the creation of the image of the city in relation to UGC published in urban squares; for instance, based on the findings of this study, the dominant type of user photograph of each urban square can be considered a priority in developing strategies for a visual social media application. Also, photographs of various activities in urban squares that revealed strong correlations with positive emotions may be utilized in creating an attractive and vibrant image of a city.

In academia, this research contributes to the growing interest in sense of place in the digital environment, employing people's geo-referenced photographs and hashtags on Instagram as an alternative participant-generated image (PGI) approach. Two main characteristics emerge from the findings on the Instagram content: the physical setting of the research sites and three dominant hashtag types: content-relatedness, documentiveness, and city-relatedness. It is clear that physical attributes of urban public space are the predominant feature across all the research sites in the creation of sense of place on Instagram, reflecting the distinctive characteristics of each public square. Likewise, PPS (2021) highlighted the importance of "a strong sense of community and a comfortable image" in creating successful spaces, as visitors' first impressions and the available photo opportunities can help build a sense of pride for the community in the surrounding area. Yet, it should be noted that a place's physical elements should provide not only the aesthetic comfort, but also functional convenience that responds to the needs of the community.

In addition, the findings of this study reveal a consistent pattern of hashtag usage across all research sites, which suggests a consistency of motivations for posting content in urban public space that goes beyond the distinct experiences offered by each square. As documentation has been shown to be a significant factor in Instagram usage in comparison to other social media forums such as the text-based platform Twitter, people who post pictures in urban public space on Instagram are likely to use hashtags to inscribe information about the content of their photographs. Thus, these results imply that users' hashtag behavior in urban public space is significantly influenced by their motivations for using the application, and also that their hashtag usage follows a certain pattern in urban public space. This suggests the need for consideration of the textual UGC in relation to social media type in the interpretation of sense of place in urban public space.

As an individual engages with public space through capturing, labeling, and sharing their experiences online, this process could affect their cognitive and affective bonds to their environment. The hashtags attached to users' photographs should not be viewed as yet another type of textual data (e.g., text content, comments, and replies); rather, they should be understood as an important indicator of the constant interactions between individuals and their environment. In addition, exploring underlying motives through user hashtags may provide meaningful insight into an individual's place identity for a particular urban space. For instance, selfies and group portraits geo-referenced to urban public spaces can be utilized as visual evidence for understanding the relationships between *self, others* and/or *environment* (Gustafson, 2001). As portraits were the only type of user photographs to show a significant relationship to hashtags of documentation and compound words with the city name, analyzing them may inform a deeper understanding of the meaning of place and the creation of self-identity in relation to others and the environment. A stronger sense of place or place attachment can be built upon

comfortable interactions with friends, neighbors and even strangers in a place (PPS, 2021). As the hashtags comprised of more than two words serve various purposes such as making suggestions or comments, expressing feelings, and promoting, the relationship between portraits and these compound tags could be further analyzed in relation to the image of the city. In addition, this type of photograph could give insight into the social aspect of a place with visual evidence of ethnic and generational diversity among visitors.

6.4 Directions for Future Research

The following are future research suggestions based on the limitations of this research and the characteristics of social media analytics.

Replication of this study for urban public space in different urban contexts. This study focused on three urban squares located in the center of business and commercial districts in New York City. There could be two approaches to replicate this study: varying type of urban public space and varying urban context. First, one or more of the other typologies offered in Gehl's (2017) Public Life Data Protocol could be studied: park, cemetery, garden, riverfront or playground. Such a study may find similarities in user's perceptions shared through photo-based applications, as well as potential differences that reflect people's behavior in each type of urban public space. Second, this study could be replicated in public squares in different urban contexts, such as residential districts or small towns, to identify similarities and differences in people's perceptions. Since the research sites for this study are iconic public spaces for both residents and tourists, user content in small-town public spaces may differ significantly from the findings of this study.

An analysis of all published content in urban public space by user type. The sample for this study represented the collective perceptions of the general public in urban

squares. A future study could examine the overall landscape of images of public space in the digital environment and the role of each type of user in the formation of sense of place on Instagram. Content generated by different types of users such as companies or city governments could be analyzed to gain a more comprehensive view of shared user perceptions of urban squares. Such a study could further explore the differences and connections between user types in relation to photos' subjects and associated hashtag patterns. As sense of place covers all the subjective values created in their environment, user demographic information such as age, gender or nationality should be taken into account to understand the shape of their perceptions in urban public space.

A study of geo-referenced user-generated content in urban spaces on another visual social media platform. Every social media platform presents its own technological affordances, culture, and unique nature of user content. This study focused on UGC from the most popular photo-sharing social media platform, Instagram. However, the same experiences in urban public space could be selected and present differently through different social media applications. A study that focused on another image-based platform, such as Flickr, Pinterest or TikTok, could identify common characteristics in perceptions and experiences of urban public space shared through image-based social media outlets. The findings from various visual social media platforms could also be compared to users' experiences shared on text-based platforms like Twitter.

A longitudinal or short-term study of user perceptions in urban public space. As mentioned in the previous chapter, it is necessary to consider appropriate period and time intervals in data collection in order to gain people's perceptions in the targeted period with higher credibility. This study collected user-generated content over a one-year period; one alternate approach involves collecting data over a longer period using the same time interval for data analysis and collection to gain a comprehensive view of sense of place.

Also, UGC from a short period for targeted events could be effective in gathering people's feedback and opinions on a specific event. Such a future study may provide a more holistic and detailed view of human cognition and perception for a particular urban public space; this would help identify the values created through repeated activities and common perceptions over both the long and short term in the digital environment.

Motivations and purposes of sharing user-generated content in urban public space through Instagram. This study interpreted patterns of hashtag usage in relation to the underlying motivations of photos shared on Instagram. A future project studying hashtag behavior in urban public space could be paired with survey results or in-depth interviews to better understand the motivations behind both the UGC in urban public space and its associated hashtags. Such a study would examine the suitability of hashtag analysis for revealing the purposes underlying the use of the platform itself. In addition, the information a few on user demographics and purpose of visit to urban public places may offer a better understanding of users' motivations for sharing their content on social media and of the formation of their digital identity.

An analysis of portraits in urban public space. Portrait is one of the dominant *photograph* types on visual social media applications, an emerging type of visual information that has so far been underrepresented in studies using the traditional participant-generated image approach to understand people's relationships with their environment. Although *portraits* featured less than photos of physical and social activity, their presence still comprised a significant portion of the UCG in the squares. They could be utilized as an important source of information in further studies using data from image-sharing social media applications. For instance, city-related tags, including the compound-word type, and associated portraits could be analyzed for people's intention or motivation based on the characteristics of the related tags.

A study of how hashtags build/contribute to a network of urban public spaces in the digital environment. As urban squares have traditionally acted as the centers of cities' networks of public open space, this study highlighted the direct contribution of UGC to the image of the city in the digital environment through city-related hashtags. A future study could identify the relationships between city-related hashtags from urban public spaces in a city, which could provide insight into the city's broader network of public places and the role of a particular urban public space in relation to the identity of the entire city.

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