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The Behavioral Patterns Of Occupants In The Housing During The Covid-19 Pandemic

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Abstract*: During the COVID-19 pandemic, housing is not only a protector and a shelter; it also accommodates all activities, both working and studying. The changes that have occurred as a result of the stay-at-home policy have made residents make various changes to their activities and adjustments to their homes. This study aims to reveal the correlational relationship between perceptions of satisfaction, changes in activities, and housing adjustments during the COVID-19 pandemic. so that it can be determined what the pattern of behaviour in the house was during the COVID-19 pandemic. This study uses qualitative methods in the first stage and quantitative methods in the second stage. The first stage investigates all changes in activity and adjustments made in the house during the pandemic. The second stage reveals the relationship between activities, mental adjustment, and perceived satisfaction in housing, including productive groups, family-oriented groups, and self-oriented groups. Productive groups tend to correlate with forms of adaptation in the form of cleaning activities, semi-public activities, and adjustments through the configuration of space and functions. Then, closeness to a family group tends to correlate with diversification activities such as online activities, online shopping, cleaning activities, room cleanliness, and increased space privacy. Meanwhile, self-oriented groups tend to correlate with activities in the room, recreational activities, and privacy enhancements. The behavioural patterns of occupants in housing during the COVID-19 pandemic that were found in this study can contribute to future residential design considerations.*
Keywords:: behavioural patterns, housing adjustments, housing satisfaction, the Covid-19 pandemic

Abstrak Di masa pandemi Covid-19, hunian tidak lagi berfungsi sebagai pelindung dan berteduh. Hunian juga dapat mewadahi segala kegiatan baik untuk bekerja maupun belajar. Perubahan yang terjadi akibat adanya kebijakan tetap di rumah saja membuat penghuni melakukan berbagai perubahan kegiatan dan penyesuaian hunian. Penelitian ini bertujuan untuk mengungkap hubungan korelasional antara persepsi kepuasan, perubahan kegiatan, dan penyesuaian hunian saat pandemic Covid-19. Sehingga dapat diperoleh bagaimana pola perilaku di dalam hunian saat pandemi Covid-19. Penelitian ini menggunakan metode kualitatif pada tahap pertama dan kuantitatif pada tahap kedua. Tahap pertama mengeksplorasi perubahan kegiatan dan penyesuaian yang dilakukan di dalam hunian pada saat sebelum dan saat pandemi . Tahap kedua mengungkap hubungan korelasional antara kegiatan, penyesuaian hunian, dan persepsi kepuasan di dalam hunian. Dari hasil analisis korelasi multivariat terungkap bahwa secara umum, terdapat pola perilaku penghuni berdasarkan persepsi kepuasan di dalam hunian, diantaranya kelompok produktif, dekat dengan keluarga, dan orientasi pada diri. Kelompok produktif cenderung berkorelasi dengan bentuk adaptasi berupa kegiatan kebersihan, kegiatan semi publik, dan

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penyesuaian melalui konfigurasi ruang dan fungsinya. Sedangkan kelompok dekat dengan keluarga cenderung berkorelasi dengan kegiatan diversifikasi seperti aktivitas online, belanja online, aktivitas kebersihan, kebersihan ruang, dan peningkatan privasi ruang. Sementara kelompok yang berorientasi pada diri cenderung berkorelasi dengan kegiatan di dalam kamar, kegiatan rekreatif. dan peningkatan privasi. Adapun pola perilaku penghuni di dalam hunian pada saat pandemi Covid-19 yang ditemukan dalam penelitian ini dapat berkotribusi dalam pertimbangan perancangan hunian di kemudian hari..

Kata kunci: pola perilaku, penyesuaian hunian, kepuasan hunian, pandemi Covid-19

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Introduction

The COVID-19 pandemic caused by the SARS-CoV-2 virus has become the highest respiratory disease fatality since influenza in 1918, which infected 500 million and killed 50 million people worldwide (WHO). The SARS-CoV-2 virus began to spread in December 2019 in Wuhan City, Hubai China and began to reach Indonesia on March 2 2020 (Tabi'in, 2020). Then the disease caused by the SARS-Cov-2 virus was declared a pandemic by the World Health Organization on March 11 2020 (WHO). The spread of the virus that is so fast has appealed to the public. Now the Covid-19 virus has spread throughout the world by claiming millions of victims. Effective prevention strategies have been driven by diligent hand washing, covering oneself when coughing or sneezing, avoiding physical contact, and maintaining distance (Acuña-Zegarra et al., 2020; Vieira et al., 2020).

In response to this problem, various policies have been issued by the Government of Indonesia to minimize the spread of the virus. One of them, on March 31, 2020, issued a policy statement on Large-Scale Social Restrictions (PSBB) (Listyaningrum & Philona, 2021). The prevention strategy of staying at home only makes people divert all their activities to be carried out in their homes (Ariyani, 2020; Yuanditasari et al., 2021). Home is the safest place to avoid spreading the virus so quickly. However, during a pandemic, the house is not only a place of refuge from the virus but also a place for activities and necessities of life, such as work and school.

The stimulus-response theory by (Iskandar, 2012) explains how the relationship between humans and their environment. A stimulus is an object or event that is captured by the senses such as changes in the human environment. The response is behaviour that occurs in humans as a result of the stimulus it receives. Facing changes related to activities that are entirely shifted in the dwelling has provided a stimulus for adaptation efforts to occur in the dwelling. People will have interactions with the buildings and built environment they inhabit. The behaviour of the people occupying the indoor space is critical to its proper function and performance as well as its maintenance (Torres et al., 2021). Community activities centred at home during the Covid-19 pandemic for quite a long time have caused changes in the

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dwelling. Activities that usually also involve the environment outside the home, now have to reduce activities outside the home while still implementing health protocols. This phenomenon indicates that there is a stimulus-response through an adaptation process in the house, both changes in behaviour and adjustments to living conditions.

Adaptation is the ability to make adjustments to circumstances to be able to maintain life with changes that occur only to himself without changing the circumstances around him. Adjustment is the ability to be able to adjust to circumstances by making changes to the surrounding environment to suit their behaviour (Bell et al., 2006; Indriyati, 2010). There are 3 adaptation strategies according to Altman et al., (1980), namely adaptation by adjustment, adaptation by reaction, and adaptation by withdrawal. Adaptation by an adjustment is a form of adaptation that is done by reducing problems between behaviour and the environment, while adaptation by the reaction is a form of adaptation done by opposing the environment, not through adjustments but through behaviour. Adaptation by withdrawal is a form of adaptation by removing pressure from an adaptive area or avoiding or leaving a stressful environment (Altman et al., 1980).

Changes and adjustments can be said to be successful when these changes can satisfy the performance, well-being or even health of the occupants of the house (Torres et al., 2021). Perception occurs when sensational elements are combined with mediation processes in the brain's neural structure so that we recognize or manage patterns of several sensations that have been translated into memory. When the physical condition of the dwelling can facilitate a compatible room function in a spatial arrangement by the occupants, then satisfaction will tend to be present as a result of an adjustment response. (Bell et al., 2006) .

In previous studies, the most common changes to occupancy or adjustments encountered were exchanges and divisions. This change was made due to additional activities in the dwelling, namely telework (Asharhani & Gupitasari, 2021). Several previous studies have attempted to reveal how behavioural adaptation and occupancy adjustments occurred during the Covid-19 pandemic in Indonesia (Ariyani, 2020; Yuanditasari et al., 2021). The changes that occur are adjusted according to human needs and habits to maintain health protocols. The flow of human movement when entering the house after activities outside the home is a consideration for the emergence of new spaces as an adaptation to the response to the Covid 19 pandemic. These new spaces include transition/transition rooms, work/school spaces, recreation/relaxation rooms, the need for adequate ventilation and green open space which is quite dominant and a special room for self-isolation (Yuanditasari et al., 2021).

However, the efforts made have not explained how the occupants' perceptions are related to the satisfaction felt in the dwelling during a pandemic. The novelty of this research is to involve the perception of satisfaction in the dwelling to identify patterns of behaviour in the occupancy during the Covid-19 pandemic.

Therefore, in this study, the researchers tried to reveal the correlational relationship between activity changes, occupancy adjustments, and occupancy satisfaction, so that patterns of behaviour in occupancy could be obtained during the Covid-19 pandemic. By knowing how the patterns of activity and space are in the

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dwelling, it is very important to find out whether these efforts have satisfied them or not (Torres et al., 2021). This research will be used as a consideration for residential planners and designers in understanding occupant behaviour patterns during the Covid-19 pandemic. This research contributes to enriching knowledge to create adaptive housing solutions in accommodating inhabitant life amidst a pandemic.

Methods

This study uses a qualitative-quantitative research approach, and mixed methods (Creswell, 2014). Exploratory research was carried out in the first stage and explanatory research in the second stage (Groat & Wang, 2013). Explorative research in the first stage was conducted to obtain information data regarding changes in activities and adjustments to occupancy by respondents. Data collection was carried out with open questions to provide freedom in answering. The data collection method used is the non-random sampling method and the snowball technique, (Kumar, 2011) namely by sending online questionnaires from one person to another within the period of 4 September 2021 – 7 September 2021. From this data collection, 148 respondents were obtained, but the data processed were 146 respondents. Reductions were made because the respondents' answers did not match the criteria for the questionnaire questions.

Data collected from open questions were analyzed by categorizing the keywords that represent them. Keywords from the activity change category include activities with gadgets, limited activities, increased interaction in the dwelling, cleanliness, the majority of activities outside the dwelling, health, the majority of activities in the dwelling, personal problems, productive in the dwelling, recreational in the dwelling, outdoor recreation. These activities include activities before and during the pandemic. While the keywords in the occupancy adjustment category include redesign, space function, health protocol requirements, comfort, natural environment, additional space, furniture, room layout, and no changes.

Explanatory research in the second phase was used to reveal the relationship between the dimensions of activity, occupancy adjustment, and satisfaction in housing. The keywords obtained from the qualitative stage were developed in the second stage as measurement variables. In the activity category, the keywords used are activities carried out during a pandemic. So that there are seven main groups, each consisting of keywords in the first stage, including activities with gadgets, productivity, interaction, recreation, health, cleanliness, and activity centres. Whereas the occupancy adjustment category is divided into two major groups, each of which includes keywords in the first stage, namely physical and spatial transformation. Then in the satisfaction category, it is grouped based on the respondents' answers in the first stage which shows the emotional perception in it. So that this group is divided into two major groups, namely positive perceptions and negative perceptions.

In general, the questionnaire consists of four main parts, namely aspects of personal data such as gender, age, occupation, income, and domicile. The second part measures activities in the dwelling during the Covid-19 pandemic which consists of 56 measurable variables. The third part deals with adjustments to occupancy during the Covid-19 pandemic which consists of 58 measurable variables. The last part, namely satisfaction in

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housing during the Covid-19 pandemic includes 12 measurable variables. So in total, there are 135 measurable variables.

Data collection was carried out using closed questions (Table 1). Questions are measured using a Likert scale. Activity categories it is measured using a scale of 0-5 showing the meaning of never, very rarely, rarely, not rarely or not often, often, and very often. Whereas in the spatial adjustment category using a scale of 0-4 which shows the meaning of not making these adjustments, a few adjustments, quite a lot, a lot, and a lot of adjustments are made. And in the satisfaction category, shows the meaning of disagreeing, somewhat agreeing, neutral, somewhat agreeing, and agreeing with the statement. At this stage, data were collected using a questionnaire which was distributed using the same method in the first stage in the period from 29 October 2021 – 16 November 2021. The respondents collected were 120 respondents. The ratio of male and female respondents is 75% for women and 25% for men. Most of the respondents were students (75%), followed by the private sector (10%), freelancers (8%), teachers and civil servants (5%), housewives (1%), and entrepreneurs (1%). Respondents live from various regions with the largest percentage, namely in Malang (28%) and Sidoarjo (13%). While the age distribution of respondents is partial

Most of them belong to the Generation Z age group (9-24 years) at 86%, then the Millennial Generation group (25-40 years) at 13%, and finally the Generation X group (41-56 years).

Table 1. Examples of Closed Questions with a Likert Scale

Variable	Measurement Scale
Activities in the house during a pandemic	Activities with gadgets
	Never 0 1 2 3 4 5 Very often
Adjustments in housing during a pandemic	Reduction of large furniture in the house
	Did not do 0 1 2 3 4 Very much
Satisfaction in housing during a pandemic	More productive
	Disagree 0 1 2 3 4 Agree

Source: author data, 2022

In the next analysis stage, factor analysis (FA) was carried out from each of the numerical data obtained. FA was obtained from principle component analysis (PCA) with varimax rotation to obtain latent dimensions representing 135 measured variables. Measured variables are reduced to latent variables which represent the most variation in the principal components. The number of latent variables is obtained by using the eigenvalues that appear when the factor analysis is carried out. The number of factors is taken based on the eigenvalues, which are more than 1. The latent variable is then given a name that represents the various measured variables in the latent variable. Then a multivariate correlation analysis was performed on latent variables to determine the correlational relationship between latent variables.

Results and Discussions

The analysis phase is carried out in stages. The first stage, namely to obtain latent variables from measurable variables compiled through factor analysis. Factor analysis was carried out on each dimension, namely changes in activities in

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the dwelling, occupancy adjustments, and satisfaction in the dwelling.

Dimensions of activities in the residential area

The dimension of activities in the dwelling includes new activities or activities that tend to be carried out as an effort to adapt behaviour to the Covid-19 pandemic in the dwelling. The results of factor analysis obtained thirteen factors that have more than one eigenvalue. These factors then become latent variables that are considered capable of representing the phenomena of 55 measurable variables in aspects of activities in the dwelling during the Covid-19 pandemic. Latent variables in the dimensions of activity change can be seen in Appendix 1 and 2. These latent variables include Cleaning Activities, Online Activities, Recreative Activities, Semi-Public Activities at Home, Online Shopping, Family Activities, Activities in the Room, Cooking, Limiting Guests, Social Interaction, Status Change, Raising Animals, and Being at Home.

Online activity is a factor dimension that has the highest average value. This variable shows the most dominant activities carried out in the dwelling during the pandemic. The measurable variables included in this latent variable include online school, online exams, playing social media, meeting friends online, online work meetings, activities with gadgets, working from home, studying or reading, and multitasking. From this, we can see that during the Covid-19 pandemic, online activities tended to be carried out at home. The development of technology makes various forms of remote activities accessible to more people. The most dominant measurable variables in this latency are activities with gadgets and social media. Apart from online activities, in-room activities are also the dominant activities carried out at home during a pandemic. Activities in the room describe how all activities tend to be carried out in the room so that the majority is always in the room starting from working, studying, sleeping, and eating.

The next activity that is quite dominating is activities related to cleanliness. The measurable variables from these latent variables include guests washing their hands before entering the house, diligently washing their hands, diligently using hand sanitiser, cleaning themselves after leaving the house, diligently cleaning the house, diligently organizing the house, regularly consuming vitamins, sunbathing programs, the majority of activities in the living room. , sitting relaxed at home, and listening to music. While the most dominant factor in this latent variable is diligence in cleaning the house, diligent in organizing the house, and diligence in washing hands.

The next dominant category is activities with the family in the dwelling. Shows that during a pandemic activities with family also tend to be carried out in the dwelling. Some of the measurable variables included in this latent variable include increasing family time, praying with the family, exercising diligently, and maintaining a healthy diet. Of the four measurable variables, increased family time is the most dominant measured variable in this latent variable.

Online shopping is the next dominant activity which includes online transactions, food taxis, online shopping, and using wifi. The most dominant factor is using wifi and online shopping. This shows that activities carried out in the residence during a pandemic are made easier by utilizing internet access using wifi and fulfilling needs through online shopping. After online shopping, the next variable is limiting guests inside the

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residence. This shows an effort to prevent the spread of the Covid 19 virus in residential areas during a pandemic. This effort is a form of adaptation carried out by residents in their dwellings. The measurable variables included in limiting guests include limiting guest activities and guests maintaining health protocols.

The next latent variable is social interaction in the house during a pandemic. Some of the measurable variables included in this category are socializing with people outside and drinking coffee at home. Then followed by the latent variable of recreational activities in the dwelling. The measurable variables included in the latent include making crafts, decorating the house, creating content, trying new things, doing business at home, playing games, relaxing (contemplating, resting more), and doing hobbies. These recreational activities were carried out during a pandemic in the dwelling, with the most dominant factors being relaxation and hobby activities.

Cooking is the next dominant latent variable. Cooking activity is one of the primary activities that occur in the dwelling. However, during the pandemic, some of the cooking activities that were carried out became a special interest to fill the time at home. Some of the measurable variables included in it are making cakes and trying new recipes. Next is being at home with the measured variables including reduced intensity of leaving the house and not buying a data package. Reduced activities outside the residence have reduced the use of internet data packages.

The last three latent variables in the category of activities in the shelter during a pandemic are semi-public activities carried out at home, raising animals, and status changes. Semi-public activities carried out in the dwelling during a pandemic include activities carried out in the dwelling bringing together many people, both members of the family and outside the residence. The measurable variables included in semi-public activities at home include the majority of activities in the living room, dining room and kitchen, as well as religious activities with neighbours at home. The most dominant factor in this latent variable is religious activities with neighbours in the dwelling. The pandemic situation does not break the ties of friendship with neighbours through religious activities in the social environment. Then the variable raising animals is the next dominant activity carried out in the dwelling during a pandemic. The status change is the final variable in the dimension of activities in the shelter during a pandemic. Status changes include changes in marital status and having offspring (children) that occur during a pandemic in the dwelling. The things above are various activities carried out in the shelter during a pandemic which can be used as a consideration in compiling a space program in the current residence.

Residential adjustment dimensions

The adjustment dimension in the occupancy includes changes in the occupancy made during the Covid-19 pandemic. From the results of the factor analysis, ten factors have more than one eigenvalue. These factors then become latent variables that are considered capable of representing the phenomena of 57 measurable variables in aspects of adjustments to housing during the Covid-19 pandemic.

Latent variables on the dimensions of occupancy adjustment can be seen in appendices 3 and 4. These latent variables include Room Configuration and Functions, Space Redesign, Furniture,

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Space Comfort, Natural Environment, Residential Cleanliness, Increasing Room Privacy, and Use of Semi-Public Spaces.

From the results of the factor analysis, it can be seen that the cleanliness of the occupancy is the most dominant adjustment latent variable because it has a high average value. Residential adjustments related to cleanliness include a cleaner and more well-maintained house, a tidier house, and adding hand sanitisers/disinfectants to the house. During a pandemic, people will pay more attention to cleanliness in their homes as a strategy to maintain health at home. What's more, for all activities that are shifted to be carried out inside the house, cleanliness will be one of the factors considered for the comfort of activities in the house. The next latent variable is increased privacy. Measurable variables include increasing the privacy of the work/study space, increasing the privacy of the room, and adding the function of the room to become a work/study space. Efforts in these measurable variables were made to obtain privacy in work and study activities, bearing in mind the addition of the function of the house to being a place for school and work during the Covid-19 pandemic.

The next dominant adjustment is the use of semi-public space. Semi-public spaces at home include the living room, family room, kitchen, terrace and other spaces that are shared in the house. This latent variable consists of measurable variables, namely the function of the family room and living room to become work/study spaces. Then followed by natural environmental latent variables.

Adjustments related to the natural environment are made inside the dwelling with the most dominant factor being adding plants to the house. While other factors included in this latent variable include adding a place to wash hands in front of the house, increasing the planting area, and adding a pool at home.

The next latent variable is the adjustment of furniture in the house. Furniture is the smallest element in a building that can be controlled to change its composition and layout. The measurable variables represented in this latent variable are reducing unused furniture, reducing large furniture, adding furniture, adding tables and chairs, adding storage cabinets, and using portable furniture. Of the several measurable variables, the dominant form of occupancy adjustment in this latency is the reduction of unused furniture and the use of portable furniture. Then the latent variable that has an average value below the furniture latent variable is the redesign of the room. Space redesign describes how the room in the house experiences adjustments with efforts to redesign the room. The most dominant factor in adjusting the room redesign is decorating the room and decorating the workspace or study room. Other redesign efforts represented by other latent variables include the layout of tables and mattresses in the room, redesigning the home page, painting the house with a new feel, decorating the living room, living room, sofa layout and living room furniture, and chair layout. between the living room and the living room. These adjustments were made to redesign the room in the house during the pandemic.

Space configuration and function is the last latent variable with the lowest average value. This adjustment illustrates how changes in occupancy are related to the layout and function of the room. The most dominating factor in this latent variable is the re-functioning of family rooms and unused spaces and changes in the function of space. Other factors that are

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in this latent variable include dividing space by providing partitions or without partitions, combining rooms by removing partitions, increasing the number of rooms, adding spaces such as transition rooms, independent isolation rooms, adding areas such as sunbathing areas, sports, and area for special storage of goods from outside the house, floor expansion, room expansion, the addition of the number of floors of the house, creating a multifunctional room, changing the function of the room, changing the location of the workspace, increasing the function of the living room and dining room for work/study. The things above are various residential adjustments made during a pandemic which can be used as a consideration in compiling a space program in the current residence.

Dimensions of occupational satisfaction

The dimension of satisfaction in the dwelling includes the emotional changes experienced. The results of factor analysis obtained three factors that have more than one eigenvalue. These factors then become latent variables that are considered capable of representing the phenomena of the 12 measurable variables in aspects of adjustments to housing during the Covid-19 pandemic. The latent variable on the dimensions of occupancy adjustment can be seen in ta. These latent variables include productivity, boredom, and closeness to family.

From the results of factor analysis, it can be seen that the most dominant dimension factor is closeness to family. This latent variable illustrates the result of limitations in activities outside the dwelling, giving rise to increased interaction with the family. With the measurable variables that represent it, it is closer to family and limited activities. The next dominant factor is productivity. Productivity represents a satisfaction dimension related to positive perceptions of performance in a dwelling. The measurable variables included in this latent variable are more productive, more effective, more focused productively, more creative and innovative, and more able to improve mentality. The satisfaction factor that dominates it is to be more focused on being productive. Meanwhile, saturation is the last factor in the satisfaction dimension which describes the negative perception of performance at home. The measurable variables included in this latent variable are increasingly lazy, easily emotional, irregular lifestyle, more consumptive, and bored. All of these satisfaction factors indicate a saturation in the occupants' emotions so that negative perceptions arise in the dwelling.

Correlation between activity change, adjustment, and satisfaction in a shelter

Furthermore, the three dimensions, namely physical characteristics, activities, and sense of place were analyzed using multivariate correlation analysis to see the causal relationship between the three dimensions. The results of the multivariate correlation analysis between the three factors can be seen in Figure 2. Figure 2 shows the value of the correlation coefficient. When the number gets higher, the correlation gets higher too. Correlation coefficient value between 0 to 1, both positive and negative. The asterisk next to the correlation coefficient is an indicator of significant value. Significant values are shown in Figure 2

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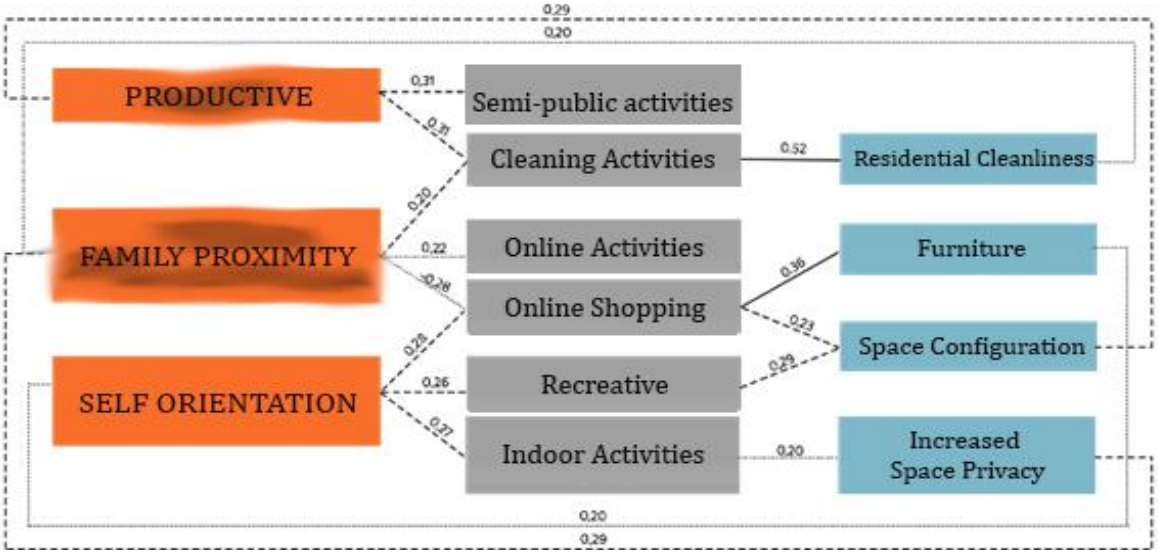

Figure 2. Correlational diagram between activity changes, occupancy adjustments, and occupancy satisfaction (source: analysis results, 2022)

Furthermore, the three dimensions which include changes in activity, adjustment, and satisfaction are analyzed using multivariate correlation analysis to see the correlational relationship between the three dimensions. The results of the multivariate correlation analysis can be seen in Table 2.

Table 2 shows the value of the correlation coefficient. When the coefficient value is high, the correlation between these dimensions becomes high. Correlation coefficient value between 0 to 1, both positive and negative. An asterisk indicates a significant value indicator.

The multivariate correlation results obtained several latent variables from the dimensions of activity and adjustment which correlate with latent variables from the dimensions of satisfaction in the occupancy. The satisfaction dimension has a direct correlation with 6 latent variables from the activity dimension, including semi-public activities, cleaning activities, online activities, online shopping, recreational activities, and in-room activities. As for the dimensions of spatial adjustment, 4 latent variables have a direct correlation with the dimensions of satisfaction in the occupancy, including adjustments to occupant cleanliness, furniture, room configuration, and increased room privacy. So from the existence of this correlation relationship, it can be obtained groups that show patterns of living in dwellings during the Covid-19 pandemic. Among them are productive groups, close to family, and self-oriented.

Productive

The productive group in the dwelling is the group that feels more effective, efficient and productive in the dwelling during the Covid-19 pandemic. Limitations that occur during a pandemic make residents divert their productivity inside their dwellings. Work and school activities have shifted to teleworking and telestudy activities. Teleworking activities can cause teleworkers to be more efficient and experience less fatigue (Escudero-Castillo et al., 2021).

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Table 2. Cause and Effect Relationship between the Activity Dimension and the Adjustment Dimension

	Satisfaction			Space Adjustment							
	Productive	Saturation	Proximity to Family	PR Room Configuration and Its Functions	Space Redesign PR	Furniture PR	Space Leisure PR	Natural Environment PR	Hygiene PR	Space Privacy Improvement PR	PR Use of SemiPublic Spaces
KR Cleaning Activities	0.31 **	-0.02	0.30 **	-0.11	-0.01	0.03	0.04	0.15	0.52 ***	0.04	0.20 *
KRN Online Activities	0.07	0.05	0.22 *	0.02	-0.05	0.06	-0.17	0.18	0.18	0 ,18	-0.12
Recreative KR	0.04	0.26 **	0.16	0.29 **	0.37 ***	0.06	0.31 **	0.07	0.07	0.23	-0.11
KR Semi Public Activities at Home	0.31 **	0.02	0.03	0.07	0.08	-0.01	0.02	0.11	0.15	-0.16	0.19
KR Online Shopping	0.10	0.28 **	-0.20 *	0.23 **	0.14	0.36 ***	-0.09	0.07	0.06	0.01	-0.15
KR Family Activities	0.15	-0.09	0.21	0.15	-0.08	0.04	0.13	0.21	0.02	0.10	-0.01
KR Activities in the Room	0.02	0.27 **	0.19	-0.08	-0.06	0.13	0.06	-0.12	-0.10	0.20 *	0.03
KRR Cooking	0.09	0.01	-0.03	0.06	0.05	0.04	0.01	0.09	0.16	-0.17	0.24 *
KR Limits Guests	0.12	0.13	-0.09	0.12	-0.10	-0.10	0.05	0.21	0.13	0.15	0.11
KR Social Interaction	0.13	-0.04	0.05	0.12	0.00	0.17	0.05	-0.10	-0.11	0.13	0.03
KR Status Change	0.01	0.07	-0.12	0.25 **	0.10	0.09	0.03	0.03	-0.13	-0.17	0.28 **
KR Takes Care of Animals	0.05	0.03	-0.08	0.24 **	0.02	-0.13	0.09	0.03	-0.17	0.02	0.08
KR is at Home	0.07	-0.12	0.11	-0.07	0.06	-0.03	0.06	-0.17	0.00	0.09	0.05
PR Room Configuration and Its Functions	0.29 **	0.18	-0.19								
Space Redesign PR	0.17	0.19	-0.07								
Furniture PR	0.01	0.20 *	-0.03								
Space Leisure PR	-0.14	0.04	0.02								
Natural Environment PR	0.18	0.13	0.04								
Cleaning PR 2	0.15	-0.10	0.20 *								
Space Privacy Improvement PR	-0.10	0.05	0.29 **								
PR Use of SemiPublic Spaces	0.19	-0.02	-0.03								

*Description *p<0.05, **p<0.01, ***p<0.001*
(Source: Author Analysis, 2022)

The good side that can be obtained from this is the flexibility to work in the living room, bedroom or dining room. The choice of place to carry out teleworking and telestudy activities are also influenced by the existence of internet connectivity in the dwelling. Bearing in mind that inside the dwelling, occupants must also share an internet connection. So shared workspaces are the choice of residents to be able to carry out activities with a shared internet connection (Lara-Pulido & Martinez-Cruz, 2021).

So that the use of semi-public spaces such as living rooms, family rooms and dining rooms is used more frequently during the Covid-19 pandemic. As a result, a new form of behaviour pattern appears in the dwelling, namely by increasing semi-public activities in the dwelling. These activities lead to semi-public space. This group of productive residents had a

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correlational relationship with semi-public activities in the dwelling during the Covid-19 pandemic (β = 0.31; p<0.0001).

Respondents who felt more productive, effective and efficient while in the dwelling also correlated with cleaning activities in the dwelling (β = 0.31; p<0.0001). The quality of the environment around will affect how productive it is. Therefore, with increased activity in the residence, residential cleanliness will be a major factor that needs to be maintained, especially during the Covid-19 pandemic. Semi-public spaces that are used more frequently during a pandemic can increase the level of concern for residents about the cleanliness of their homes. This is shown in the correlational relationship where cleaning activities correlate with the use of semi-public spaces (β = 0.20; p<0.05).

Space adjustments are made in the dwelling when the changing conditions can no longer be tolerated. The transfer of all production activities in the dwelling results in a change in the pattern of living in the house. According to Morris & Winter, (1975) residents who can tolerate changes in these patterns will still maintain their residential conditions. Meanwhile, residents who feel there is a gap from the situation before the Covid-19 pandemic will make adjustments in their dwellings. Residents will redistribute functions in the house because they prioritize other interests that must be accommodated. The distribution of space functions is to provide practical solutions, such as redistribution of functions and allocation in space. Coupled with the diversity of desires of each individual in the dwelling. Some family members need calm and focus more so that insulation is needed in the dwelling or the allocation of space functions (Bettaieb & Alsabban, 2020).

The addition of productivity activities in the dwelling also causes limited space in the house to be able to accommodate all the productive activities of the members of the dwelling. Adjustments by increasing the number of rooms, expanding floors, dividing space, changing space functions and all forms of adjustments in the form of space configurations are carried out in the dwelling. These adjustments were made to be able to further enhance the addition of new functions to the productivity space in the dwelling. In the correlational relationship, there is a relationship between the perception of being more productive with adjustments through spatial configuration and function (β = 0.29 ; p <0.01).

Family Proximity

This group is residents who feel closer to their families during the Covid-19 pandemic. This group has a correlational relationship with forms of adaptation in the dwelling, namely online activity (β = 0.22; p<0.05) and online shopping (β = -0.28; p<0.05). Technological developments have contributed to various forms of work and distance learning (Nakrošienė et al., 2019). During the Covid-19 pandemic, various work and learning activities as well as meeting with friends moved online. The change in activities in the dwelling to be completely online means that everyone has a lot of time to spend with their family at home. highlighting the (theoretical) benefits that remote work brings to people who work remotely.

It turns out that work done inside the dwelling has a flexibility effect because it has greater autonomy and more time to spend with the family or for leisure (Nakrošienė et al., 2019). Likewise in fulfilling household needs can be easily fulfilled through e-commerce and online

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shops. This is a form of family adaptation in fulfilling needs through online shopping.

Closeness to the family also correlates with cleaning activities in the dwelling (β = 0.20; p <0.01). Families tend to maintain cleanliness more with the Covid-19 pandemic. To maintain the health of people at home, various behavioural adaptations such as washing hands, cleaning oneself before entering the house, and using disinfectants after interacting with the outside environment have become new habits. The routine of consuming vitamins and sunbathing programs are also new habits in the house. These activities are a form of adaptation carried out since the Covid-19 pandemic to maintain family health to prevent transmission of the Covid-19 virus. Interaction within the family to be able to work hand-in-hand to maintain health and cleanliness is urgently needed in realizing family health resilience at home in a pandemic situation. As shown a correlational relationship between respondents who feel close to the family and make adjustments to the cleanliness of the occupancy (β = 0.20; p <0.05).

Self-orientation

This group is self-oriented residents so they feel bored and bored in the house during the Covid-19 pandemic. This group has a correlational relationship with adaptation behaviour including doing activities in the room, doing recreational activities, and tend to shop online. In the qualitative research stage, it was explained that changes in activities in the dwelling, especially for respondents with student status, tended to carry out activities in the room taking into account the effectiveness at home during a pandemic. Another study conducted by (Encinas et al., 2021) proved that there was a psychological impact of the Covid-19 pandemic on students. Among them due to sleep problems, stress, and social dysfunction. This was due to prolonged confinement (Encinas et al., 2021). Self-oriented residents tend to do activities centred in the room and increase the privacy of their room. This is shown by the existence of a correlational relationship between feelings of saturation (β = 0.27; p<0.01), adaptation to activities centred in the room (β = 0.20; p<0.01), and increased privacy space (β = 0.29;p<0.01). Other research shows that most families seem to increase the level of privacy in their homes according to the residential design (Bettaieb & Alsabban, 2020).

Various new creativity through social media has also emerged as a result of the Covid-19 pandemic, as is the case with creating content on Tiktok, Instagram and Youtube. Other recreational activities are also carried out by residents to reduce boredom in the dwelling such as playing games, doing hobbies, and making crafts at home. Self-oriented groups adapt to be able to solve their boredom problems while at home by doing recreational activities. Recreative activities have a correlational relationship with feelings of boredom during a pandemic at home (β = 0.26; p<0.01). Feelings of saturation also cause people to be more consumptive. Various conveniences have been offered with the existence of technology during a pandemic, one of which is the existence of various e-commerce and online shops that facilitate this. This convenience provides a great opportunity to be able to shop online at home. However, with this convenience, people will be even more consumptive by shopping online at home. Where more consumptive is one of the factors in the saturation dimension. This is shown in the correlational relationship between feelings of saturation and online shopping (β = 0.28; p<0.01).

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So to conclude each correlational relationship between activities and occupancy adjustments and satisfaction in occupancy can be seen in the relationship diagram model in (Figure 2). Overall productive groups, close to family, and self-oriented have a correlated relationship with changes in activity or called behavioural adaptation and adjustment to occupancy. Behavioural adaptation has more correlation with satisfaction than with adjustments to occupancy. Fewer adjustments are made as these efforts require more physical and financial energy from the occupants. So that these efforts also need to be considered in making decisions to obtain satisfaction in the dwelling. This shows that every effort made by residents to be able to adapt to the pandemic situation is considered whether these efforts can provide satisfaction towards a positive perception of satisfaction in the dwelling such as being more productive and getting closer to family or instead only making it more boring and bored in the house.

Conclusion

This research reveals how patterns of behaviour in residential areas are due to the co-19 pandemic. 13 latencies were found in the dimension of activities that occurred in the dwelling due to the Covid-19 pandemic. These latencies include cleanliness, online activities, recreational activities, semi-public activities at home, online shopping, activities that tend to be in the room, cooking, limiting guests, social interaction, status changes, raising animals, and reduced intensity of going out of the house. Whereas in the occupancy adjustment dimension there are 8 patents including adjustments to space configuration and function, space redesign, furniture, space comfort, natural environment, residential cleanliness, increased room privacy, and use of semi-public spaces.

This study also reveals how the correlation relationship between activity changes, occupancy adjustments, and satisfaction in housing. From this correlational relationship, 3 patterns of behaviour were obtained in the dwelling due to the Covid-19 pandemic based on satisfaction, namely the productive group, the group close to family, and the self-oriented group. The group addresses the positive and negative perceptions of residents in the dwelling during the co-19 pandemic. Satisfaction in the dwelling consists of positive perceptions consisting of being productive and close to family. Meanwhile, negative perceptions indicate feelings of boredom in the dwelling which are indicated by self-oriented. The productive group correlates with cleaning activities, semi-public activities, and adjustments in the form of spatial configuration and function. Meanwhile, the group that felt closer to their families at home during the COVID-19 pandemic tended to correlate with online activity, online shopping, cleaning activities, room configuration, and increased room privacy. The self-oriented group tends to correlate with recreational activities, online shopping, in-room activities, and increased bedroom privacy. Research shows that the form of adaptation in the form of adjustments to occupancy is more common in groups that have positive perceptions of satisfaction compared to negative perceptions. Positive perceptions include productive groups and groups close to family. Negative perceptions, namely groups that are self-oriented, do more behavioural adaptations as a form of solving boredom and boredom in the dwelling. Adjustment efforts are only made by increasing room privacy. More behavioural adaptations Behavioral

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adaptations are more widely practised and tend to correlate with satisfaction in housing than forms of adaptation with adjustments or changing occupants.

This study has the disadvantage of not including sociodemographic factors (age, income, occupation, number of members in the dwelling, education) and architectural aspects (occupancy area, type of occupancy, quality of occupancy) in the respondent's dwelling. Therefore, researchers suggest conducting further research by including these aspects in the study as variables included in the correlation model. This must be considered considering that adaptation efforts will never be separated from the adaptive capacity to carry out these efforts. The sociodemographic background of the respondents is a basic thing that needs to be used to find out how the capacity of the respondents to make adaptive efforts in the form of behavioural adaptation and residential adjustments during the Covid-19 pandemic. It is hoped that this research can contribute to the formation of knowledge of occupant patterns in dwellings during a pandemic. So that it can be taken into consideration in designing housing during the Covid-19 pandemic.

Author's statement

The authors are with this declare that this research is free from conflicts of interest with any party, has never been published in any place and has complied with the rules of publication ethics.

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Author(s) Contributionship

Hana Hali Nurrahmada contributed to research design preparation, literature review, data collection, data visualization, data analysis, and article drafting.

Hanson E Kusuma contributed to supervising the research design, data analysis, and article draft review.

Allis Nurdini contributed to supervising the research design, data analysis, article draft review and editing.

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Appendix 1. Results of Analysis of Factors Dimensions of Activities in Residential During Pandemic

Dimensions	Variable	Means	Load
Cleanliness	Guests wash their hands before entering the house	3.35	0.78
	Wash your hands frequently	3.91	0.77
	Diligent use of hand sanitiser	3.61	0.75
	Clean yourself after leaving the house	3.93	0.75
	Diligent cleaning of the house	4.00	0.73
	Diligently organize the house	3.90	0.60
	Regular consumption of vitamins	3,21	0.57
	sun program	2,7	0.52
	The majority of activities in the living room	3,17	0.47
	Sit relaxed at home	3.75	0.45
	Listening to music	3.88	0.35
Online Activities	Online school	4.03	0.88
	Online exams	3.91	0.82
	Social media	4,19	0.77
	Meet friends online	3,32	0.71
	Work meetings via online	3.85	0.68
	Gadget activity	4,24	0.65
	Online school/college	4.05	0.61
	WFH	3.73	0.52
	Study or read	3.61	0.44
	Multitasking	3.59	0.42
Recreative Activities	Making crafts at home	2.45	0.81
	home decorating	2,8	0.78
	Create content at home	2.43	0.74
	Trying new things at home	3,275	0.62
	Business at home	1.95	0.56
	Play games at home	2.74	0.52
	Relaxation (contemplate, rest more)	3,725	0.45
	Do hobby activities	3,7	0.42
Semi-Public Activities at Home	The majority of activities in the living room	2.35	0.74
	The majority of activity in the dining room	2.48	0.71
	Most of the activities are in the kitchen	2.61	0.62
	Religious activities with neighbours	2.64	0.37
Online shopping	Online transactions	3.01	0.75
	Gojek food	2.88	0.73
	Online shopping	3,22	0.72
	Using Wi-Fi	4,22	0.51
Family Activities	Time with family increases	3.84	0.64
	Worship with family	3,6	0.62
	Do sports	2.65	0.61
	Keep the diet	3,32	0.54
Indoor activities	Tend to be in the room	3.95	0.79
	The majority of activities in the room	3.81	0.70
	Watch movies at home	3.75	0.44
	Not accompanying school children at home	3.65	0.42
Cook	Making cake	2.75	0.86
	Trying new recipes	2.55	0.85
Restricting Guests	Guests with health protocols	3,375	0.74
	Restrict guest activities	3,25	0.68
Social interaction	Socialize with people outside	3,11	0.72
	Coffee at home	2,775	0.42
Status Change	Status Change	1.39	0.78
Raising animals	Keeping pets	2.46	0.74
The intensity of leaving the house is reduced	Don't buy data packages	1.60	0.61
	The intensity of leaving the house is reduced	3.59	0.55

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Appendix 2. Mean and Loading Factor of Each Variable on the Dimensions of Activities in Shelters During a Pandemic

	Cleanliness	Online Activity	recreational	spring activities public at home	Online shopping	Joint Activities family	Inside activities room	Cook	Limit guests	Social interaction	Status change	Raising animals	At home
Means	3.58	4,24	2.88	2.52	3,33	3.35	3.79	2.65	3,26	2.94	1.39	2.46	2,6
Standard Deviation	0.94	1.06	1.15	0.98	1.18	0.966	0.968	1.48	1.02	1.09	0.91	1.97	0.98
Alph Cronbach	0.91	0.9	0.86	0.75	0.83	0.77	0.64	0.91	0.68	-	-	-	-
EigenValue/Variance	6,46	6,22	4.81	3.08	2.99	2.87	2.83	2.49	2.25	1.73	1.58	1.56	1.48
Percentage of Variance	11.76	11.32	8.75	5,61	5,44	5,23	5,15	5	4,1	3,14	2.87	2.84	2,7
Cum Percent	11.76	23.08	31.84	37,45	42.89	48,13	53,28	57,82	61.9	65,1	67.95	70,79	73.5

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Appendix 3. Results of the Analysis of Adjustment Dimension Factors in Shelters During a Pandemic

Dimensions	Variable	Means	Loading factor
Space Configuration and Its Functions	Addition of the number of floors of the house	0.975	0.862
	Dividing space without giving a partition	0.966	0.859
	Addition of transition space	1,100	0.849
	Increase in the amount of space	1.175	0.844
	Floor extension	0.950	0.844
	Addition of sports area/room	1,191	0.823
	Reduce the area of the room	0.891	0.810
	Dividing space by giving a partition	1.025	0.809
	The living room is in an open or semi-open space	1,100	0.808
	Combining rooms by removing room dividers	0.983	0.794
	Additional sunbathing area	1,233	0.793
	Additional self-isolation room	1,191	0.792
	Room Expansion	1,341	0.733
	Changing the location of the kitchen to be closer to the outside area	1,041	0.725
	Adding a special storage area for items from outside the home	1.316	0.718
	The function of the clothes drying area is increased for sunbathing	1,483	0.675
	Change of workspace location	1,533	0.657
	Create a multifunctional room	1,708	0.625
	Re-enable unused space	1,741	0.610
	The function of the dining room increases for work/study	1.208	0.595
	Space function change	1,750	0.562
	The function of the living room increases as a sleeping area	1,250	0.519
	Re-enable the family room	1,908	0.484
Space Redesign	Sofa layout and living room furniture	1,352	0.782
	The layout of the chair between the living room and the living room	1,288	0.735
	Decorating the family room	1,495	0.711
	Decorating the living room	1.475	0.696
	Room Decoration	2,041	0.639
	The layout of furniture to facilitate access or circulation within the dwelling	1,875	0.544
	Reduction of the sofa in the living room	0.850	0.536
	Decorating work/study space	2,15	0.521
	Painting the house with new nuances	1,563	0.499
	Redesigning the garden/home page	1,907	0.473
	The layout of the work desk/study table and bed in the room	2,000	0.446
Furniture	Furniture increases	1,750	0.798
	Add tables and chairs	1,708	0.774
	Add a storage cupboard	1,644	0.739
	Portable furniture	1,900	0.715
	Reduction of unused furniture	1,932	0.698
	Massive reduction of furniture	1,440	0.512
	Furniture increases	1,750	0.798
Space Comfort	Increase access to incoming light	1,950	0.673
	Increase air circulation	1,957	0.650
	House renovation	1,352	0.547
	Replace the lamp to be brighter	1,925	0.545
	Gives eco enzymes	1.316	0.499
Natural Environment	Adding plants to the house	2,235	0.661
	Adding a place to wash hands in front of the house	1,875	0.648
	Additional planting area	1,850	0.593
	Adding a pool at home	0.975	0.580
Residential Cleanliness	The house is cleaner and well maintained	2,783	0.766
	The house is tidier	2,714	0.724
	Adding hand sanitiser/disinfectant in the house	2,650	0.463
Improved Space Privacy	Improved work/study space privacy	2,258	0.768
	Improved room privacy	2,258	0.731
	The function of the room is increased to become a work/study space	2,641	0.687
Use of Semi-Public Space	The function of the family room increases to become a work/study space	1,933	0.779
	The function of the living room increases to become a work/study space	1,791	0.769

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Appendix 4. Mean and Loading Factor of Each Variable on the Adjustment Dimensions in Housing During a Pandemic

	Room configuration and function	Space redesign	Furniture	Space comfort	Natural environment	Cleanliness	Improved space privacy	Use of Semipublic Space
Means	1.26	1,6	1.71	1.67	1.73	2.72	2.38	1.86
Standard Deviation	1.15	1.08	1,2	1.26	1.18	1.07	1.23	1.37
Alpha Cronbach	0.97	0.93	0.9	0.91	0.82	0.81	0.82	-
EigenValue/Variance	15,34	5.96	5,3	3.46	3,27	3.05	2.85	2.83
Percentage of Variance	26,91	10.5	9,3	6.07	5.75	5,36	5	4.98
Cum Percent	26,91	37,4	47	52,7	58.5	63,8	68.8	73,8

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